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Rev. 07/10/02

SECOND ADDENDUM TO THE FEASIBILITY STUDY

NL/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS

Prepared for

U.S. Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

February, 1995

U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

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EXECUTIVE SUMMARY

NL/Taracorp Superfund Site
Second Addendum to the Feasibility Study

The generation of the Second Addendum to the Feasibility Study (FS) for the NL/Taracorp Superfund Site (NL Site), in Madison County, Illinois, was conducted as part of Woodward-Clyde Consultants (WCC) indefinite delivery contract with the United States Army Corps of Engineers, Omaha District (USACE) (Contract No. DACW45-93-D-0005).

The purpose of the Second Addendum to the Feasibility Study for the NL/Taracorp Site (O'Brien & Gere, 1989) is to update the nature, extent, fate, and transport of contamination in light of new data collected during the Pre-Design Field Investigation (PDFI). Based on this update, remedial options for portions of the site other than the residential areas are evaluated.

This Second Addendum does not address the soil cleanup levels and method (excavation) established in the ROD for the residential and industrial areas, or for the Taracorp drums. These aspects of the remedy will only be discussed to the extent that they are affected by the alternatives presented in this addendum.

The NL Site includes a former secondary lead smelting facility which operated from 1903 until 1983. A battery breaking operation was conducted on-site from the 1950s until 1983. From 1981 to 1983, St. Louis Lead Recyclers Inc. (SLLR) operated a lead reclamation operation on the Trust 454 property, which is now part of the site adjacent to the former smelter. Residuals and contamination from both operations are still present on the site.

The NL Site can be subdivided into three principle types of areas: the Main Industrial Property (Taracorp, Trust 454, BV&G Transport, and Rich Oil), the Adjacent Residential Areas within the cities of Granite City, Madison, and Venice, and the Remote Fill Areas.

The Main Industrial Property consists of approximately 30 acres of property that includes a former secondary lead smelting facility (NL/Taracorp) and a former battery recycling operation (St. Louis Lead Recyclers (SLLR)). Separate waste piles, the Taracorp pile and the SLLR piles, cover portions of the industrial property. These piles, which meet the requirements necessary to be regulated as landfills under Resource Conservation and Recovery Act (RCRA), have a combined total volume of approximately 124,000 cubic yards, and is estimated to weigh roughly 220,000 tons. The volume and weight estimates for the waste piles have been recalculated based on the recently completed waste pile investigation (W-C, 1995). Components of this waste material are present in the soil under unpaved portions of the main industrial site to a depth of approximately 2 feet.

The Adjacent Residential Areas include approximately 500 acres within the cities of Granite City, Madison, and Venice, Illinois, where lead contamination present in the soil is due to airborne particulate fallout from the secondary lead smelter. An estimated 1,595 residential properties are included within this area, with lead levels in the upper foot of soil ranging from less than 5.1 mg/kg (ppm) to 20,100 mg/kg.

Fill material derived from the Taracorp and SLLR piles has been documented primarily by USEPA at numerous locations on the NL Site. These Remote Fill Areas include locations in Eagle Park Acres and Venice Township, six locations outside of Granite City, and four locations within Granite City. Soil lead levels in these areas range from 19.4 mg/kg to 68,400 mg/kg, with the soil in over 30% of these locations characterized as hazardous waste by the Toxicity Characteristic Leaching Procedure (TCLP).

The groundwater quality under the Main Industrial Area does not meet the Illinois Groundwater Quality Standards. Based on groundwater monitoring results from both the RI/FS and the PDFI, it appears that contaminated groundwater may be migrating off-site, and contamination appears to extend deeper into the aquifer than previously thought.

Current regulations were reviewed to determine the Applicable or Relevant and Appropriate Requirements (ARARs) for the NL Site. These were divided into three groups: chemical specific, action specific, and location specific. Remedial Action Objectives for waste piles, soil, remote fill, and groundwater were then established on the basis of these ARARs.

The remedial action objective for the Taracorp and SLLR piles is to eliminate the exposure pathways in order to reduce the risk to human health and the environment. The material in the waste piles has been characterized as hazardous by EP-TOX (O'Brien and Gere, FS, 1989). It is likely that the material would also be characterized as hazardous by the more recent TC procedure. If this material is taken off-site for disposal, it will likely require treatment to meet the land disposal treatment standards for lead. If the waste piles are left on-site and the exposure pathways are eliminated by capping, no treatment is required.

Since the Illinois state requirements are more stringent than the Maximum Contaminant Levels (MCLs) and action levels mandated by the Clean Water Act, the remedial action objectives for groundwater are based on the Illinois Groundwater Quality Standards. These standards define a Class 1 aquifer as located ten feet or more below the ground surface with a hydraulic conductivity of 1 X 10^{-4} cm/sec or greater and that can produce sufficient quantities of water for potable use. Assuming that the aquifer underlying the site meets the IEPA definition of a Class I aquifer, the allowable total lead concentration for the groundwater is 0.0075 mg/l.

The remedial action objective for air is to maintain air quality at less than 1.5 ug of lead per cubic meter in ambient air (maximum quarterly average). This objective has been met in the vicinity of the NL/Taracorp site since 1986, as documented by IEPA air monitoring, and during the remedial action activities.

A wide variety of remedial alternatives were considered. These ranged from a No Action Scenario, where only institutional controls would be utilized, to excavation and removal of all contaminated material from the site in conjunction with groundwater extraction and treatment. Treatment and disposal options considered included on-site disposal with no treatment, on-site treatment with either on-site or off-site disposal, on-site treatment and sorting for off-site recycling, and off-site treatment and disposal. The No Action Scenario is not discussed in this addendum since it has been adequately addressed in the ROD and in the original FS.

The alternatives considered for soil/waste media on the Main Industrial Site were:

- Source removal to on-site landfill (consolidation)
- Source removal to on-site landfill; on-site treatment of material characterized as hazardous waste

- Source removal to off-site landfill; off-site treatment of hazardous waste
- Source removal to off-site landfill; on-site treatment of hazardous waste
- Source removal with on-site sorting, treatment; off-site recycling, disposal

The alternatives considered for soil media from remote fill areas were:

- Removal of remote fill from residential areas; capping of alleys and driveways; treatment of remote fill characterized as hazardous
- Removal of remote fill from all remote fill areas; treatment of remote fill characterized as hazardous waste

The alternatives considered for groundwater media were:

- Monitoring and natural attenuation
- Pump from main industrial site, treat if necessary, dispose of into local POTW
- Containment of contaminated groundwater by slurry wall, with limited pumping from within slurry wall to maintain inward gradient, disposal into local POTW

The alternatives were evaluated and screened in accordance with USEPA guidance documents.

1.0 INTRODUCTION

A Remedial Investigation (RI) at the NL/Taracorp Site (NL Site) was completed by O'Brien and Gere in September, 1988. Based on the findings of the RI, a Feasibility Study (FS) documenting the formulation and evaluation of remedial alternatives for the site was completed by O'Brien and Gere in August, 1989. The First Addendum to the FS was issued by USEPA on January 10, 1990. More recently, in March 1993, the Final Report on the Pre-Design Field Investigation (PDFI) was completed by Woodward-Clyde (W-C). During and subsequent to the PDFI, numerous additional remote fill areas were identified. These areas were investigated and sampled as part of the Supplemental Investigation to the PDFI which was completed in October, 1993 by W-C. The PDFI also documented a more extensive groundwater contamination problem than had previously been identified. The PDFI serves as the design for all elements of the cleanup except for the cap.

The USEPA has remediated the worst contaminated remote fill areas under the USEPA/USACE rapid response program. To facilitate the remediation and disposal of the remote fill areas, an Explanation of Significant Differences (ESD) was issued by the USEPA to allow off-site disposal of this material. A second ESD was issued to facilitate the remediation and disposal of the most highly contaminated residential soils. Based on the findings of the PDFI, the USEPA decided that it was necessary to issue this Addendum to the FS that incorporates the findings of the PDFI and the Supplemental Investigation. These findings include an updated assessment of conditions and contamination on the site .

1.1 PURPOSE AND ORGANIZATION OF THIS ADDENDUM

The purpose of this second Addendum to the 1989 FS is to update the assessment of the nature and extent of contamination, and to re-evaluate contaminant fate and transport based on the additional data collected by the PDFI and the Supplemental Investigation. These activities form the basis for a reevaluation and ranking of the remedial alternatives using performance based response criteria, including new technologies developed since the 1989 FS and subsequent first FS Addendum were completed.

The second Addendum to the FS does not address the soil cleanup levels and method (excavation) established in the ROD for the adjacent residential and industrial areas, or for the Taracorp drums. These aspects of the remedy will only be discussed to the extent that alternatives in the second addendum affect the ultimate disposition of excavated materials.

This second Addendum to the FS is organized in the following manner. An updated review of pertinent background information is presented in Section 1. This includes discussions of the site description and history, the nature and extent of contamination, and contaminant fate and transport.

Section 2 identifies potentially applicable remediation technologies for each of the media of concern and presents a discussion of these technologies in terms of remedial action objectives, performance response criteria, and general response actions. The remediation technologies are screened and evaluated based on these objectives and criteria.

Section 3 discusses the development of remedial alternatives, and explains the rationale and logic for assembly of these alternatives. This is followed by a discussion of the screening process for the remedial alternatives. Section 4 presents an analysis of the alternatives, including a comparative analysis and ranking of the alternatives.

1.2 BACKGROUND INFORMATION

The NL Site is located almost entirely within the cities of Granite City, Madison, and Venice, in Madison County, Illinois. It is approximately two miles east of downtown St. Louis, Missouri (**Figure 1-1**). The Main Industrial Property is located at the southern end of Granite City and at the northern border of Madison.

1.2.1 Site Description

The site is located within the portion of the Mississippi River Valley known as the American Bottoms. This area is protected from Mississippi River flooding by a levee system designed for a 500 year flood. Portions of the site, however, are located in areas which may be impacted by floods with less than a 100 year frequency due to possible ponding and backwater. The area is underlain by a sequence of Quaternary age alluvial, glaciofluvial and glaciolacustrine sedimentary deposits associated with the Mississippi River Valley. These deposits generally extend to a depth of approximately 100 feet and tend to become coarser with depth. These deposits unconformably overlie the local bedrock, which is comprised of Mississippian age limestone, sandstone and shale of the upper Valmeyeran Group. The RI described the surficial soils as typically silty clays to fine sandy loams of the Riley-Landes-Parkesville Association that are generally under grass or forest cover. The site area is a typical river floodplain, tending to be flat and poorly drained. Localized street flooding is a common problem during heavy rains.

The site can be divided into three areas: The Main Industrial Properties (currently owned by Taracorp, Trust 454, BV&G Transport, and Rich Oil), the Adjacent Residential Areas (Granite City, Venice and Madison), and the Remote Fill Areas containing hard rubber battery casing material and slag derived from the Taracorp waste pile (**Figures 1-2, 1-3** and **1-4**).

1.2.1.1 Main Industrial Properties

The Main Industrial Properties consist of approximately 30 acres that is the location of a former secondary lead smelting facility and battery cracking operation (NL/Taracorp), a former battery recycling operation (formerly St. Louis Lead Recyclers (SLLR), now Trust 454), a trucking company (BV&G Transport), and a fuel oil distributor (Rich Oil). Discrete separate waste piles, the Taracorp pile and the SLLR piles, cover portions of the site (**Figure 1-5**). Based on testing of waste pile material during the Supplemental Investigation, the waste piles are estimated to have a combined volume of approximately 124,000 cubic yards, weighing roughly 220,000 tons (W-C, 1995). Approximately 80 percent of the waste pile material present is blast furnace slag (O'Brien & Gere, 1988), with the remainder being a mixture of broken battery casing material, lead oxide dust, and drummed smelter drosses.

1.2.1.2 Adjacent Residential Area

The Adjacent Residential Area surrounding the Main Industrial Property, as delineated in the Record of Decision (ROD), includes approximately 500 acres within the cities of Granite City, Venice, and Madison, Illinois. Data gathered during the PDFI investigation, suggests that the extent of the affected adjacent residential area may be more extensive than previously thought. The lead contamination present in the soil is primarily due to airborne particulate fallout from the secondary lead smelting operations (**Figure 1-2**).

1.2.1.3 Remote Fill Areas

The ROD identified a number of areas where material containing hard rubber battery casing material from the Taracorp waste pile was used as fill and paving material. Numerous additional areas have been identified during and subsequent to the PDFI (**Tables 1-1** and **1-2**). The remote fill areas include 30 locations in Eagle Park Acres (**Figure 1-6**), one residence and most of the alleys in Venice (south and southeast of Madison; **Figure 1-7**), three areas north of Granite City (Missouri Avenue, Sand Road, and Schaeffer Road), four areas within Granite City (2230 Cleveland Avenue, 3108 and 3213 Colgate Avenue, and 1628 Delmar Street), and two areas in Glen Carbon, Illinois (**Figure 1-2, 1-3** and **1-4**).

1.2.2 Site History

The NL/Taracorp Site is the location of a former secondary lead smelting facility. A variety of metal refining, fabricating, and associated activities were conducted at the site starting prior to 1900. From 1903 until 1983, a secondary lead smelter operated on-site. A battery breaking operation operated on-site from the 1950s until 1983. Both the secondary smelting and battery breaking operations were discontinued in 1983, and the equipment was dismantled.

In 1981, St. Louis Lead Recyclers, Inc. (SLLR) began operations on the property adjacent to the NL/Taracorp plant site (now the Trust 454 property). The objective of the SLLR operation was to separate and recycle the components of the Taracorp pile. The venture did not prove to be profitable, and SLLR discontinued operations in 1983. However, residual material and equipment from this operation remain on the Trust 454 property.

1.2.3 Summary of the ROD

Based on the results presented in the RI, delineating and characterizing contamination at the NL Site, the remedy required by the ROD specified that all residential soils and battery casing materials around the site, as well as in Venice, Eagle Park Acres, and other nearby communities with soil lead concentrations greater than 500 mg/kg be excavated and either consolidated with the Taracorp pile or disposed of off-site. Soil on the main industrial site with soil lead concentrations greater than 1000 mg/kg would be excavated and consolidated with the Taracorp pile. Remote fill material characterized as hazardous by either TCLP or EP Tox would require treatment prior to incorporation into the Taracorp pile. Soil or remote fill material that would be removed from the site for disposal or recycling that has been characterized as hazardous by TCLP or EP Tox would have to comply with the appropriate land disposal restrictions for hazardous waste. The Taracorp pile would be covered with a multi-media cap, while the new portions of the pile would also require a clay liner. No groundwater remedial action was recommended.

An ESD was issued by USEPA to allow off-site disposal of this material. A second ESD was issued to facilitate the remediation and disposal of the most highly contaminated residential soils.

1.3 NATURE AND EXTENT OF CONTAMINATION

Subsequent to the completion of the RI/FS, the PDFI collected a considerable amount of data on soil lead levels in the main industrial area, the adjacent residential areas, and the remote fill areas. Data on metals contamination in groundwater at the main industrial site was also collected. These analytical results from the PDFI indicate that the level and extent of lead contamination in both soil and groundwater is significantly greater than that indicated in the RI/FS.

1.3.1 Taracorp and SLLR Piles

The on-site waste piles were originally sampled and characterized as part of the RI. No additional characterization samples have been collected from the waste piles on the main industrial site. Based on the analytical results from the RI, the material contained in both the Taracorp and SLLR piles is characterized as hazardous for lead and cadmium by the EP Tox method.

1.3.2 Main Industrial Area Soils

The findings of the PDFI confirmed those of the RI/FS which found soil lead levels well in excess of the 1000 mg/kg action level specified in the ROD for this area.

The discussion in the FS of soil lead levels on the main industrial property is based on four soil samples collected from two locations. Subsequently, the PDFI collected a total of 105 analytical soil samples from 15 soil borings in order to delineate the extent of soil lead contamination identified by the RI/FS.

For the unpaved areas of the Trust 454 property, the results of the PDFI indicate that soil lead concentrations range from less than 6.0 mg/kg to 345,000 mg/kg (as compared to 9250 mg/kg in the RI/FS). Soil lead concentrations above the action level specified in the ROD of 1000 mg/kg extend to an average depth of approximately 2 feet.

For the BV&G Transport property (BV&G), the results of the PDFI indicate that lead concentrations range from less than 6.5 mg/kg to 91,500 mg/kg (as compared to 4,000 mg/kg in the RI/FS). Soil lead concentrations above the action level of 1000 mg/kg extend to an average depth of approximately 2 feet.

The Rich Oil property was not discussed in the FS. For the Rich Oil property, the results of the PDFI indicate that lead concentrations range from less than 7.3 mg/kg to 1,330 mg/kg, with soil lead concentrations above the action level of 1000 mg/kg extending to an average depth of approximately 2 feet.

Based on the results of the PDFI an estimated 35,000 cubic yards of material will require excavation and removal from the unpaved portions of the main industrial area.

1.3.3 Residential Soils

The conclusions drawn in this section of the FS were based on a total of 50 soil samples collected from outside of the main industrial area. These samples were collected from depths of 0-3 inches and 3-6 inches. One sample was analyzed using the EP Tox procedure and the EP Tox metals were found to be below action levels.

Subsequently, 5,645 soil samples were collected during the PDFI and the Supplemental Investigation and analyzed for total lead content to delineate the extent of the soil contamination in the adjacent residential areas (as defined in the ROD). The two investigations sampled a combined total of 955 residential and public properties for total soil lead concentration. Samples from 0-3, 3-6, and 6-12 inch depth intervals were collected from the front and back yard of each residence. Total lead concentrations ranged from less than 5.1 mg/kg to 20,100 mg/kg (as compared to 45 mg/kg to 14,700 mg/kg in the RI/FS). 650 of the 955 properties were found to have at least one sample with total lead concentrations in excess of the 500 ppm cleanup standard. Several of the residential properties located near the main industrial properties have been remediated under the Rapid Response Program. A list of the properties remediated under this program are listed in **Table 1-3**.

Ten of these soil samples were analyzed for TCLP-Lead. The ten samples that were selected had a broad range of total lead concentrations to determine if there was a correlation between the total lead concentration and TCLP leachate concentration that could be used to characterize the residential soil for disposal. Only one of the ten samples analyzed yielded a leachate concentration in excess of the 5 mg/l regulatory requirement for hazardous waste, and no obvious correlation between total lead concentration and TCLP leachate concentration was apparent. Based on the results of the PDFI, it is estimated that 92,900 cubic yards of soil from the adjacent residential areas exceeds the 500 mg/kg action level and will require remediation. However, lacking a good correlation between total soil lead concentration and TCLP-Lead, TCLP-Lead analysis will still be required to determine if the excavated soil should be characterized as hazardous.

1.3.4 Eagle Park Acres

The discussion of lead contamination in Eagle Park Acres in the FS is based on a total of eight soil samples collected from four locations, with total lead concentrations ranging from 63 mg/kg to 8,030 mg/kg. Based on the results from these samples, the FS estimated that approximately 2,700 cubic yards of material would require removal.

Subsequently, a total of nine properties were sampled during the PDFI (**Table 1-1**). A total of 72 samples were collected and analyzed for total lead. Total lead concentrations were found to range from 19.4 mg/kg to 68,400 mg/kg. Twenty-five of these soil samples were also analyzed for TCLP-Lead. The leachate levels ranged from less than 0.18 mg/l to 322.0 mg/l lead. These samples were collected from the nine properties where hard rubber battery casing material was originally identified in order to more accurately delineate the extent of contamination.

After the completion of the PDFI, 20 additional properties and one alley (**Table 1-1**) in Eagle Park Acres were identified by the USEPA as containing contaminated fill material. A total of 118 soil samples were collected from the 21 properties for total lead analysis as part of the supplemental investigation. Total lead concentrations ranged from 6.5 mg/kg to 26,300 mg/kg. The results from these properties indicated that 16 of the 21 properties contained fill material with a soil lead concentration in excess of the 500 mg/kg action level for residential areas, and/or with hard rubber battery casing material. In addition, 48 of these samples were also analyzed for TCLP-Lead. Leachate levels ranged from less than 0.1 mg/l to 1,687 mg/l lead.

Based on these combined results from the PDFI and supplemental investigation, the estimated volume of material requiring remediation from these properties was revised to 3,940 cubic yards. Of this volume, approximately 1,130 cubic yards is characterized as hazardous (based on TCLP-Lead analysis) and would require treatment if disposed of or recycled off-site.

A number of these properties have been remediated as part of the USEPA/USACE rapid response program. In addition, several additional properties containing contaminated fill material were identified, investigated, and remediated during the rapid response program. A list of the properties that have been remediated under the rapid response program is included as **Table 1-3**.

1.3.5 Venice Alleys

The discussion in the FS of lead contamination in the Venice Alleys is based on a total of eight soil samples collected from seven locations with a range of total lead concentrations of 200 mg/kg to 126,000 mg/kg. Based on these samples the FS estimated that approximately 670 cubic yards of material would require remediation.

Subsequently, during the PDFI, a total of 10 samples were collected from the five alleys that were originally documented by the USEPA to contain hard rubber battery casing material. These samples were analyzed for TCLP-Lead. The resulting leachate concentrations ranged from less than 0.65 mg/l to 93.4 mg/l. Based on these results and a visual survey of the alleys, an estimated 3,650 cubic yards of material would be characterized as hazardous waste, and would require treatment prior to off-site disposal. The five alleys were documented to have leachable lead concentrations that were well in excess of the regulatory standard of 5.0 mg/l. Two of the five alleys were remediated in 1993 as part of the USEPA/USACE rapid response program for this site. A list of the remediated alleys is included in **Table 1-3**.

After the conclusion of the PDFI, the USEPA determined that nearly all of the alleys in Venice contain fill mixed with hard rubber battery casing material. The USEPA grouped the alleys into four categories on the basis of a visual survey:

- Category I: Severe contamination requiring immediate action. These 15 alleys have been sampled and remediated by OHM as part of the ongoing USACE Rapid Response Program. The remedial costs for those alleys that have been remediated are included in the remedial cost estimates presented in this document (see Section 4.0). A list of the remediated alleys is included in **Table 1-3**.

- Category II: Extensive hard rubber battery casing material present. These 23 alleys were sampled as part of the supplemental investigation. Samples collected were analyzed for Total Lead concentration and for TCLP-Lead.

- Category III: Scattered hard rubber battery casing material present. These 15 alleys were also sampled as part of supplemental investigation. Samples were analyzed for Total Lead concentration. Those samples that were found to exceed the 500 mg/kg action level specified in the ROD were also analyzed for TCLP-Lead.

- Category IV: Paved or very minor concentrations of hard rubber battery casing material noted. No action required at this time.

Analysis of data from the 38 alleys that were sampled as part of the Supplemental Investigation (Categories II and III) have resulted in a substantial increase in the estimated volume of material that will require remediation. Of the 152 soil samples that were collected and analyzed for Total Lead, 102 of these samples were also analyzed for TCLP-Lead. Total Lead concentrations ranged from 35.5 mg/kg to 16,200 mg/kg. Levels of lead leachate ranged from less than 0.1 mg/l to 178 mg/l. Based on the results from these 38 alleys, an estimated additional 8,465 cubic yards of material will require remediation. Of this amount, it is estimated that 1,900 cubic yards of material would be characterized as hazardous waste, and will need to be stabilized if disposed of off-site.

1.3.6 Other Remote Fill Areas

A number of other remote fill areas were also identified after the submission of the RI/FS. Six of these were sampled during the PDFI (**Table 1-2**). Four additional remote fill areas were identified after the completion of the PDFI and were sampled as part of the Supplemental Investigation (**Table 1-2**).

During the course of the PDFI and Supplemental Investigation, a total of 24 soil samples were collected and analyzed from these properties for total lead content and 6 of these samples were also analyzed for TCLP-Lead. Total lead concentrations were found to range from 10.0 mg/kg to 6798 mg/kg, while TCLP-Lead leachate concentrations ranged from less than 0.1 mg/l to 23.2 mg/l.

Four of the locations that were identified and sampled (2230 Cleveland, 1628 Delmar, 3108 Colgate, and Missouri Avenue) have been remediated as part of the USACE rapid response program for this site (**Table 1-3**).

One location that was sampled during the supplemental investigation, the alley opposite Guy and Meridian Streets in Glen Carbon, Illinois, was found to have soil lead levels in excess of the 500 mg/kg action level. Based on these results, it is estimated that an additional 290 cubic yards of material would require remediation at this location. One of the six samples that were analyzed for TCLP-Lead yielded a leachate concentration of 23.2 mg/l, in excess of the 5.0 mg/l regulatory limit. Additional characterization may be necessary prior to excavation and disposal at this site.

1.3.7 Groundwater

The FS only noted two wells (Wells #108S and 108D, closest to the pile) with metal concentrations above MCLs (cadmium), and concluded that no significant contamination was migrating off-site. Two significant factors contributed to this conclusion:

1. At the time the wells were sampled for the RI/FS, the MCL for Lead was 0.10 mg/L.

2. The analyses cited in the RI/FS were performed on filtered groundwater samples.

In 1992, the Maximum Contaminant Level (MCL) for lead promulgated under the Safe Drinking Water Act was withdrawn and replaced with an action level of 0.015 mg/l. In addition, based on discussions with the IEPA and USEPA, it appears that the shallow aquifer at the NL Site meets the requirements specified in the Illinois Groundwater Quality Standards (IGQS) (Illinois Administrative Code, Title 35, 1991) for a Class I aquifer. For a Class I aquifer, the IGQS for lead is 0.0075 mg/l (Table 1-4).

As part of the PDFI and PDFI Supplemental Investigation, W-C has conducted four groundwater sampling events. The analytical results from groundwater samples collected as part of these sampling events indicated that 14 wells (all sampled wells except for wells MW-103-91 and MW-111-92) had lead levels above the current action level of 0.015 mg/l for at least one sampling event, and 15 wells (all sampled wells except for well MW-103-91) had lead levels above the IGQS of 0.0075 mg/l for at least one sampling event (Table 1-5). Five wells (MW-101, MW-104, MW-104-92, MW-107S, and MW-107D) had lead levels above the current action level for lead (0.015 mg/l) during three out of the four sampling events.

Two upgradient wells (MW-110 and MW-111-92) are located approximately 400 to 500 feet northeast of the Main Industrial Property boundary. These wells are located within the Adjacent Residential Area. Well MW-111-92 is screened from 58 to 68 feet in depth. Samples collected and analyzed from this well between July, 1992, and April, 1994, yielded total lead concentrations ranging from less than 0.002 mg/L to 0.017 mg/L. Of the five samples collected and analyzed during this period, one sample, collected in October, 1992, was found to have a total lead content in excess of the IGQS of 0.0075 mg/L (0.017 mg/L).

This sample was an unfiltered sample. Subsequent unfiltered samples have yielded results below the method detection limit.

Well MW-110 is screened from 30 to 35 feet. Samples collected and analyzed from this well between July, 1992, and April, 1994, yielded total lead concentrations ranging from less than 0.002 mg/L to 0.009 mg/L. Of the five samples collected and analyzed during this period, one sample, collected in October, 1992, was found to have a total lead content in excess of the IGQS of 0.0075 mg/L (0.009 mg/L). This sample was an unfiltered sample. Subsequent unfiltered samples have yielded results below the method detection limit.

With respect to other metals included on the target analyte list, four wells (MW-101, MW-107S, MW-108S, and MW-108D) had cadmium levels in excess of the MCL of 0.005 mg/l (**Table 1-5**). Five wells (MW-101, MW-104, MW-107S, MS-107D, and MW-108S) had arsenic levels in excess of the MCL of 0.05 mg/l. Four wells (MW-104, MW-106S, MW-107S, and MW-108S) had nickel levels in excess of the MCL of 0.1 mg/l. Two wells (MW-106S and MW-107S) had chromium levels in excess of the MCL of 0.1 mg/l, and one well (MW-108D) had zinc levels in excess of the IGQS of 5.0 mg/l (**Table 1-5**).

It is also noted that four of the shallow wells (MW-102, MW-105S, MW-106S, and MW-108S) which contained lead and other target analyte metals at levels above the respective MCLs, action levels, or IGQS have been sampled only once due to low water levels. In future events, these shallow wells may repeatedly contain metal levels above the respective MCLs, action levels, or IGQS due to downward migration of the metals from the contaminated surface soils and waste piles.

Using the current IGQS of 0.0075 mg/l for lead, a review of the results in the RI/FS indicate that four wells (MW-101, MW-102, MW 106, and MW-108) had at least one sample with a total filterable lead level greater than 0.0075 mg/l (**Table 1-5**). In, addition, during the RI/FS, unfiltered samples were collected and analyzed from three wells (MW-102, MW-106S, and MW-108D) which yielded total lead concentrations of 0.05 mg/l or greater, well in excess of the IGQS for lead of 0.0075 mg/l.

The scope of work for the PDFI specified that groundwater analyses should be conducted on unfiltered samples instead of filtered samples as were collected during the RI. The use of unfiltered samples is in accordance with current IEPA regulations and follows current accepted scientific practice. Because of this difference in sampling protocol. the results obtained from the PDFI samples may not be directly comparable to those collected during the RI/FS.

The FS (O'Brien and Gere, 1989) states (page 9, second paragraph) that "the data suggests that metals contamination in the groundwater is not migrating off site". As part of the PDFI, additional monitoring wells were installed and were screened in deeper intervals (60-70 feet) than the existing monitoring wells (15-35 feet). Based on the additional data obtained during the PDFI, it appears likely that metals contamination may be migrating off site to the west and southwest.

One well that was installed as part of the PDFI, MW-104-92, is located in an apparent downgradient position (near the west boundary of the NL/Taracorp property), is screened deeper than the older wells (60-70 feet versus 15-35 feet), and has yielded total lead concentrations (0.043 mg/l to 0.51 mg/l) that were consistently in excess of the action level (0.015 mg/l) and the IGQS (0.0075 mg/l). This suggests that groundwater contamination may have a greater mobility and vertical extent than was previously reported in the FS.

1.4 CONTAMINANT FATE AND TRANSPORT

1.4.1 Air Pathway

The FS states that the potential for off-site airborne transport of lead residue in the form of windborne particulate matter is minimal based on 1987 air monitoring data. The areas of contamination have not changed appreciably since that time. There is no new data available that would significantly change the conclusions concerning the air pathway as presented in the FS.

1.4.2 Soil and Direct Contact Pathways

As stated in the FS, the soil and direct contact pathways still appear to be the most likely avenues for ingestion of lead contaminated material. A significant change from the conclusions drawn in the FS involves the areas of potential exposure. These now appear to be considerably more extensive, with soil lead concentrations above the residential action level of 500 mg/kg covering a larger area than previously thought.

1.4.3 Surface Water Pathway

There appears to be no change for this pathway from the analysis in the FS. The closest surface water bodies are Horseshoe Lake and the Mississippi River. Both appear to be too distant from the site to be significantly impacted by contamination from the NL Site. Runoff from the waste piles or other contaminated areas is generally absorbed into the soil and migrates down to groundwater, and under saturated conditions, runoff drains into the combined sewers of the Granite City Sewer District. In Eagle Park Acres the topography is relatively flat and runoff is generally absorbed into the soil or forms surface puddles and evaporates.

1.4.4 Groundwater Pathway

While the conclusion in the FS that there are no current groundwater receptors in the area still appears to be valid (there is one user who waters the lawn with groundwater), the degree of groundwater contamination apparently attributable to the on-site waste piles appears to be substantially greater than that identified in the FS. Based on the results of groundwater sampling from the deeper wells installed as part of the PDFI it does not appear that the areal or vertical extent of groundwater contamination has been fully delineated. It is likely, therefore, that additional wells will be necessary to make this determination.

1.4.5 Summary of Contaminant Fate and Transport Pathways

The two pathways for human exposure that were cited in the FS, the airborne route and the direct contact and ingestion route, still remain as feasible exposure pathways. In addition, based on the PDFI and Supplemental Investigation groundwater results, and on the IGQS guidelines for Class I aquifers, the potential for a groundwater pathway should also be addressed.

1.5 DISCUSSION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Applicable or Relevant and Appropriate Requirements (ARARs) establish a framework for the selection of a remedial alternative at the NL Site. ARARs are site specific and need to be reevaluated as part of the review and ranking of remedial alternatives for the NL Site.

ARARs are separated into three general types: chemical specific, action specific, and location specific. Chemical specific requirements generally are health or risk based values or methodologies which result in numerical values establishing the acceptable concentration of a chemical in the ambient environment.

Action specific requirements are usually technology or activity based requirements or limitations on actions taken with respect to hazardous wastes.

Location specific requirements are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

To implement the ARARs provision, it should be determined if the regulatory requirement is applicable or appropriate and relevant.

> "Applicable requirements mean those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site" (Section 300.5 of the NCP, 55 FR at 8814).

> "Relevant and appropriate requirements mean those cleanup standards [that] ... address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site." (Section 300.5 of the NCP, 55 FR at 8817).

There is more flexibility with the relevance and appropriateness determination. For some situations only portions of a requirement or regulation may be judged relevant and appropriate and those specific portions are only applied to the site. However, if a requirement is determined as being applicable, all substantive parts must be followed (USEPA, 1992).

Once it is determined that a requirement or portion of a requirement is relevant and appropriate, it must be complied with as if it were applicable. On-site actions must comply only with the substantive portions of a given requirement and not the administrative requirements (i.e.-permitting, record keeping, and reporting) (USEPA, 1992). A summary of ARARs for the NL/Taracorp site is presented in **Table 1-6**.

The Federal government (USEPA) has delegated the Illinois Pollution Control Board the authority to manage and enforce all or part of the Federal regulations promulgated under a variety of legislation, including: the Safe Drinking Water Act; Clean Water Act; Resource, Conservation, and Recovery Act (RCRA); and the Clean Air Act. Through Illinois's environmental regulations and laws, Illinois has met the Federal environmental law requirements or criteria and in some cases has applied more stringent requirements, limitations, or criteria.

1.5.1 Chemical Specific Requirements

1.5.1.1 Air

The chemical specific ARAR for air has not changed from that presented in the original FS. The ambient air quality standard for lead is still 1.5 ug/m^3 based on a maximum arithmetic mean average over a calendar quarter. In addition, remediation and construction activities must meet the OSHA construction standards for worker exposure to lead in air as specified in 29 CFR 1910, and 29 CFR 1926.62.

1.5.1.2 Taracorp Pile and Other Wastes

If the waste material in the Taracorp and SLLR piles is capped and is not removed from the site, then no chemical specific requirements apply. If, however, it is required that the waste material be disposed of off-site, then the appropriate land disposal restrictions for hazardous waste disposal apply (35 IAC Part 728). For lead, the material must be stabilized to pass the lead treatment standard of 5.0 mg/l for TCLP-Lead.

1.5.1.3 Soils

While there is no ARAR for lead contaminated soil, recommended cleanup criteria for soil are specified in the ROD for the NL site. They require that contaminated residential soils with greater than 500 mg/kg total lead content, and industrial area soils with greater than 1000 mg/kg total lead content will be excavated and removed. The second Addendum to the FS does not address the cleanup criteria for the Adjacent Residential Areas and for soils within the Main Industrial Property. This second addendum will only address cleanup criteria for residential soils within the remote fill areas.

1.5.1.4 Groundwater

According to the IGQS (35 IAC, Part 620), the aquifer underlying the site qualifies as a Class I aquifer based on its depth, permeability and potential yield (located ten feet or more below the ground surface with a hydraulic conductivity of 1×10^{-4} cm/sec and that is capable of producing sufficient quantities of water for potable use). This differs from the conclusions drawn in the 1989 FS. For a Class I aquifer, the IGQS requires a total lead content of less than 0.0075 mg/l. Federal regulations as specified in the Safe Drinking Water Act require an action level for lead of 0.015 mg/l. The IGQS for other metals are equivalent to the MCLs except for copper which has an IGQS of 0.65 mg/L compared to the Federal action level of 1.3 mg/L. These standards are not currently being met on the site for lead, cadmium, chromium, nickel, and arsenic.

1.5.2 Action Specific ARARs

Hazardous Waste Landfill on-site: Testing conducted as part of the RI (O'Brien and Gere, 1988) indicated that the materials contained in the Taracorp pile and surrounding soils are classified as characteristic hazardous wastes by EP Tox due to the leachable metal content. The Illinois regulations concerning management of hazardous waste are contained in 35 IAC Subtitle G Parts 700 through 729. Management and closure of new and existing landfills are addressed in 35 IAC Part 724, Subpart N. Final cover requirements for an existing landfill as described in 35 IAC 724.410 are:

- Provide long term minimization of migration of liquids through the closed landfill
- Function with minimum maintenance
- Promote drainage and minimize erosion or abrasion of the cover
- Accommodate settling and subsidence so that the integrity of the cover is maintained
- Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present

After closure, the following additional requirements are imposed under 35 IAC, Subtitle G. Part 724.410:

- Maintain the integrity and effectiveness of the final cover
- Operate a leachate collection and removal system until no leachate is detected
- Continue groundwater monitoring, comply with requirements of subpart F
- Prevent run-on and run-off from eroding or otherwise damaging the final cover
- Protect, maintain surveyed benchmarks used in complying with Section 724.409

Solid Waste Landfill on-site: For disposal of waste that is not characterized as hazardous waste that has been treated (e.g. stabilized) and meets the toxicity characteristics as nonhazardous, these wastes may be disposed of into a solid waste landfill. The Illinois regulations concerning management and design of solid waste landfills are 35 IAC Part 811 Subpart C: Putrescible and Chemical Waste Landfills. The landfill should be equipped with a liner system consisting of a leachate drainage and collection system and a compacted earth liner and a final cover system. Requirements for the liner system and the final cover system include the following:

- The bottom liner should consist of a compacted five foot earth liner with a maximum hydraulic conductivity of 1×10^{-7} cm/s or a composite liner consisting of a 60 mils thickness geomembrane overlying a compacted three foot earth liner with a maximum hydraulic conductivity of 1×10^{-7} cm/s.

- The leachate collection system should be designed to maintain a maximum head of leachate one foot above the liner. The leachate drainage layer should be no less than one foot thick with a minimum hydraulic conductivity of 1×10^{-3} cm/s. The leachate collection system should include collection pipes and a leachate management system which may include an on-site leachate treatment system.

- The final cover system should consist of a low permeability layer overlain by a final protective layer. The low permeability layer may either consist of a three foot compacted earth liner with a maximum hydraulic conductivity of 1×10^{-7} cm/s or a geomembrane which provides performance equal or superior to the compacted earth liner. The final protective layer which overlies the low permeability layer should consist of a three foot soil layer capable of supporting vegetation.

Off-Site Landfill: Transportation and disposal requirements of hazardous wastes off-site would be applicable to 35 IAC, Parts 700-729. Transportation and disposal requirements of special wastes (nonhazardous) off-site would be applicable to 35 IAC, Parts 808 and 809.

Waste Pile Treatment On-Site: If on-site treatment of the material contained in the waste piles is conducted, it would be required to comply with the technical criteria included in 35 IAC Subtitle G, Parts 700 - 725. Treatment activities would also have to be conducted in a manner which would meet the required chemical ARARs.

Waste Pile Treatment Off-Site: If the material contained in the pile requires treatment at an off-site hazardous waste treatment, storage, and disposal (TSD) facility, the following would apply. The TSD facility would need to be in compliance with the Resource Conservation and Recovery Act (RCRA), and with IEPA regulations if the facility is in Illinois. Applicable regulations would include generator and transportation requirements specified in 35 IAC Subtitle G, Parts 700, 722, and 723.

In addition to the ARARs that are listed above, the fugitive dust regulations included in 35 IAC Subtitle B, as well as OSHA construction and worker safety standards (29 CFR 1926.62, and 29 CFR 1910.120), would apply to all remedial and construction activities.

1.5.3 Location Specific ARARs

Floodplain Regulations: Part of the main industrial site and some of the remote fill locations are within the Mississippi River floodplain. While no structures are planned for these areas, landfill construction at these locations would be required to comply with existing hazardous or solid waste location standards (35 IAC Section 724.118 or 811.102). Floodplain regulations are not considered ARARs for areas of the site which are outside of the flood plain.

Wetlands Regulations: None of the areas within the NL/Taracorp Superfund Site have been identified as or are adjacent to wetlands. Therefore, wetlands regulations are not considered ARARs.

Storm Water Run-off Regulations: All remedial activities would be required to comply with storm water run-off regulations (35 IAC Part 309, Subpart B: Other Permits (Construction)). These regulations are considered a location specific ARAR for this site.

Pertinent City or County Regulations: Remedial activities will be required to comply with pretreatment requirements of the local Publicly Owned Treatment Works (POTW) for acceptance for disposal of either surface water runoff, or water produced on-site, including groundwater.

1.6 REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives for the NL/Taracorp Site for each complete exposure pathway where a potential risk to human health and the environment has been identified are presented in the following section. The following discussion presents the logic and rationale used to develop the appropriate objectives.

1.6.1 Soil

The remedial action objective for soil in residential areas, as established in the ROD, is to have a maximum soil lead concentration of 500 mg/kg via excavation. Based on research data from both this site and other areas, soil lead levels in excess of 500 mg/kg correspond with increases in blood lead level concentrations above background.

The remedial action objective for soil in industrial and commercial areas on the main industrial property, as established in the ROD, is to have a maximum soil lead level of 1000 mg/kg via excavation. Since public access to the industrial property is much more limited than to residential property, it is reasonable to establish a higher action level for these areas.

1.6.2 Waste Piles

The remedial action objective for the Taracorp and SLLR piles is to eliminate the exposure pathways in order to reduce the risk to human health and the environment. The materials contained in the waste piles are characterized as hazardous by EP-Tox (O'Brien and Gere, 1989, FS). If this material is taken off-site for disposal, it will require treatment to meet the TCLP requirement for lead. To be considered non-hazárdous, material must contain less than 5 mg/l of lead in the TCLP leachate.

1.6.3 Groundwater

The remedial action objectives for groundwater are based on the Illinois Groundwater Quality Standards. These standards define a Class I aquifer (Potable Resource Groundwater) as located ten feet or more below the ground surface with a hydraulic conductivity of 1 X 10^{-4} cm/sec and that can produce sufficient quantities of water for potable use (35 IAC Subtitle F, part 620). Based on these criteria, the aquifer underlying the site meets the definition of a Class I aquifer. The allowable total lead concentration for a Class I aquifer is 0.0075 mg/l. For other metals, including cadmium, chromium, nickel, and arsenic, the IGQS is equivalent to the MCLs (cadmium = 0.005 mg/l; chromium = 0.1 mg/l; nickel = 0.1 mg/l; arsenic = 0.05 mg/l) **(Table 1-4)**.

1.6.4 Air

The remedial action objective is to maintain air quality at less than 1.5 ug of lead per cubic meter in ambient air (quarterly average). This objective has been met on the NL/Taracorp site, as documented by IEPA air monitoring, since 1986.

2.0 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

2.1 SCREENING CRITERIA AND METHODOLOGY

The identification and screening of remedial technologies was accomplished using a multi-phased approach similar to that discussed in the USEPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final, October 1988 (Guidance Document). This section describes and documents the identification and screening of technologies that are potentially applicable to the NL Site.

Based on the remedial action objectives and ARARs, general response actions for each medium of interest are defined such that the remedial response objectives would be satisfied. The volumes and/or areas of contaminated media are identified and the level of protectiveness specified. Respective technologies and process options are then screened on the basis of technical implementability. Technology types and process options which cannot be effectively implemented are not considered further. The remaining technology types and process options are then screened in greater detail with respect to the data gathered during the RI/FS and PDFI based on the following criteria, as defined in the Guidance Document:

Effectiveness - Specific technology processes that have been identified should be evaluated based on their effectiveness relative to other processes within the same technology type. This evaluation should focus on:

- The potential effectiveness of process options in handling the estimated areas or volumes of media and in meeting the required remediation goals
- The potential impacts to human health and the environment during the construction and remediation phase
- How proven and reliable the process is with respect to the contaminants and conditions at the site

Implementability - This encompasses both the technical and administrative feasibility of implementing a technology process. The detailed evaluation of process options places greater emphasis on the institutional aspects such as the ability to obtain necessary permits; availability of treatment, storage and disposal services; and the availability of equipment and skilled workers to implement the technology.

Cost - Cost analysis plays a limited role in the screening process and is limited to relative capital, and operation and maintenance costs, rather than detailed estimates.

2.2 GENERAL RESPONSE ACTIONS (FOR EACH MEDIUM OF INTEREST)

General Response Actions pertinent to the NL Site are based on the Remedial Action Objectives presented in **Section 1.7**. The General Response Actions which were determined to be applicable to these objectives were limited action/institutional actions, containment/collection actions, removal actions, treatment actions, and disposal actions. A No Action scenario was considered in the original FS and in the ROD in accordance with the requirements of the Guidance Document (USEPA, 1988). In light of this, no additional discussion of the No Action scenario will be presented in the Second Addendum.

2.2.1 Limited Action/Institutional Action

This general response action does not contain technologies but rather can be used to identify contamination problems in the absence of remediation. Certain institutional controls would be implemented under a Limited Action scenario. These controls could include federal, state, or local legal restrictions. These could be enacted and enforced to protect human health and the environment in the vicinity of the site. Examples include deed restrictions, land use restrictions, and local zoning ordinances. Site access restrictions, such as fencing, are also considered under institutional controls. Some or all of these controls would be incorporated into all of the alternatives discussed in this document.

2.2.2 Containment/Collection Actions

Containment/Collection Actions include technologies which isolate materials from migration pathways or receptors such that exposure pathways are not complete. These actions would include options such as contamination consolidation and capping for solid media; and containment, leachate collection, and extraction for groundwater.

2.2.3 Removal Actions

Removal Actions include technologies and process options which prevent complete exposure scenarios by removing the contaminant source. These actions include removal methods which address lead contaminated soils, waste piles, and groundwater.

2.2.4 Treatment Actions

Treatment Actions include technologies and process options that reduce the toxicity, mobility, or volume of contaminants such that acceptable levels of risk are attained. These actions can apply to both solid media and to groundwater, and include physical treatment, chemical treatment, and recycling.

2.2.5 Disposal Actions

Disposal Actions present one option for the final disposition of the contaminated material. For solid media, based on the characterization of the contaminated material, this could include disposal at:

- An off-site RCRA compliant hazardous waste TSD facility, and
- An off-site special waste landfill, and/or
- An on-site landfill

It could also include incineration of certain materials such as the hard rubber battery casing material. For groundwater, the principal viable option is disposal through the local POTW.

2.3 IDENTIFICATION AND SCREENING OF TECHNOLOGY TYPES AND PROCESS OPTIONS

Each of the potentially applicable remedial technologies and process options can be grouped under one of the five General Response Action Categories. The technology types and process options that fall within each category will be discussed in turn (**Table 2-1**).

2.3.1 Limited Action/Institutional Action

As previously discussed, this general response action does not contain technologies but rather can be used to identify contamination problems in the absence of remediation. The Limited Action Scenario would not achieve the remedial action objectives, and would not be effective in reducing exposure to contamination.

Under the Limited Action Scenario, the institutional actions that are already in place would be continued, and additional institutional actions could be implemented. These additional actions include restrictions on land usage, property transfers, and groundwater usage. Institutional controls will be implemented wherever wastes have been left in place. The ongoing groundwater and air monitoring programs would continue and would provide information concerning possible migration of contaminants off-site. Site access restrictions could be strengthened to include additional fencing around contaminated areas to reduce the potential for direct contact. Groundwater remediation would be accomplished through natural attenuation.

The initial screening of institutional actions found them to have potential applications on the main industrial site. Although they would not be effective in reducing contamination, additional access restrictions would limit the possibility of direct contact exposure. Air and groundwater monitoring would provide information relative to the migration of contaminants. The options identified under Limited Action/Institutional Actions will be considered further.

2.3.2 Containment Actions

2.3.2.1 Solid Media

Containment Actions for solid media could include capping and on-site land disposal technologies. The capping options include asphalt and concrete for alley areas; and a multimedia compliant cap for the consolidated waste piles.

The use of asphalt or concrete as a capping material would require the installation of an appropriate subgrade layer of material over contaminated areas. The SLLR pile would be excavated from its current location and consolidated with the main Taracorp pile if the pile is left on site. An on-site landfill cell would be constructed adjacent to the Taracorp pile to contain the SLLR pile with the main pile. A liner system and a multimedia cap would be installed for this new cell. The liner system could consist of a simple low permeability clay liner; a geocomposite clay liner with a leachate collection system; or a RCRA Subtitle C compliant liner with a leachate collection system, an impermeable HDPE liner, a secondary leachate collection (detection) layer, and a composite bottom liner consisting of an impermeable HDPE liner and low permeability clay liner. For the on-site landfill cell constructed adjacent to the Taracorp pile, a RCRA Subtitle C compliant liner would be very expensive to implement. Although it would be highly effective in containing the waste, the adjacent Taracorp pile would not have any liner. For these reasons a simple clay liner with a multi-media cap would be protective of human health and the environment and would be cost-effective. If the contaminated soil and waste piles are stabilized, a solid waste landfill design with a geocomposite liner and leachate collection system is appropriate.

The multimedia cap would be comprised of a low permeability clay layer, an impermeable High Density Poly Ethylene (HDPE) liner, a drainage layer or synthetic geonet layer, a geotextile filter fabric layer, and a vegetated topsoil layer. A drainage collection and disposal system to contain surface run-off would be required around the perimeter of the pile.

The process options of capping and on-site landfilling for both remote fill and industrial settings appear to be potentially applicable to the NL Site and will be considered further.

2.3.2.2 Groundwater

Containment and Collection Actions for groundwater could include the installation of impermeable barriers to restrict off-site flow of groundwater, or installation of on-site pumping wells to create an on-site flow gradient. Source removal in conjunction with natural attenuation through the gradual desorption of bound lead from the soil is also an option.

One process option for a vertical impermeable barrier would be the installation of a slurry wall to bedrock around the perimeter of the main industrial site. Such a structure would contain the contaminated groundwater on-site and eliminate further off-site migration of contamination. However, such a system would not eliminate or reduce the level of groundwater contamination on-site, and would be relatively costly to implement. Long term maintenance and monitoring would be required. Other options included in this technology type, such as a vertical or horizontal grout curtain, interceptor trenches, and sheet piles, do not appear to be feasible based on technical and cost concerns.

Containment of groundwater could also be accomplished by reversal of the groundwater flow gradient so that groundwater does not flow off-site. This would require the use of one or more pumping wells to develop a cone of depression in the water table on-site. When coupled with source removal, this approach could accelerate the natural attenuation process. This approach is technically feasible and relative to construction of a slurry wall is less expensive to implement. However, the long term operation and maintenance costs would be significantly higher than those associated with a slurry wall. Long term maintenance and monitoring would be required.

Of the process options described above, the installation of pumping wells to create an on-site flow gradient, installation of a slurry wall, and source removal in conjunction with natural attenuation appear to be effective options and will be considered further.

2.3.3 Removal Actions

2.3.3.1 Solid Media

Removal actions include excavation for soil, remote fill, and waste piles. Excavation options available include both mechanized and manual techniques, depending on the setting and constraining factors. Heavy equipment could be utilized to excavate contaminated material on the main industrial site, most remote fill areas, and some residential properties. Where noise is a concern or where there are space limitations, extensive manual excavation may be necessary.

Of the process options described above, excavation has a potential application on the NL Site and will be considered further.

2.3.4 Treatment and Recycling Actions

2.3.4.1 Solid Media

Treatment actions for solid media include stabilization, recycling/recovery, chemical/physical treatment technologies, and bioremediation. Technologies in these categories can be used to reduce, minimize or eliminate the mobility, toxicity, and/or volume of contaminants. As shown in **Table 2-1**, a number of treatment technologies and process options have been identified. Those technologies that are applicable to the NL site will be carried forward for further evaluation (**Table 2-2**).

The process options for stabilization include a number of proprietary processes, such as those marketed by Heritage, OHM, PDC, and Chem Waste. Stabilization processes are used to physically or chemically bind contaminants such that their mobility is reduced or eliminated. To date this has been most effective when the contaminated material is excavated and mixed with the stabilizing agents in a reactor vessel. The reduction in leachability of the contaminants makes them non-hazardous as demonstrated by the TCLP test.

More recently, a number of companies have been working to develop insitu stabilization techniques that would be much less disruptive. This approach would involve the installation of a series of horizontal perforated pipes within the contaminated medium to allow the introduction of the proprietary stabilization agents. This process option does not appear to be applicable to the surficial soils across the site due to the relatively low permeability, but could have potential applications to the Taracorp and SLLR waste piles. To date, however, these insitu technologies have only been bench scale tested, and should be considered experimental.

Some alternative stabilization techniques include cold mix asphalt stabilization, and insitu and exsitu vitrification. These do not appear to be applicable at this site:

- The cold mix asphalt process stabilizes contaminated soil by mixing it with asphalt (Testa, et al, 1992). The resulting product is then used as road paving material. Although the cold mix asphalt process has been shown to effectively stabilize lead contamination in soil, there is no data available on the long term stability of the resulting material to determine if repaving public roads with this material could be creating a future exposure problem as the road surfaces deteriorate.

- Insitu vitrification would involve inducing an electrical current through the contaminated soil producing an insitu stabilized glass like product (USEPA, 1991). This technique does not appear to be applicable at the NL site due to the potential fire hazard created by the hard rubber battery casing material present in the soil.

- Exsitu vitrification is a proven, effective stabilization technique that fuses the excavated soil into a nonleachable glass like material in a high temperature reactor vessel (USEPA, 1992). However, the cost to implement this remedial technology would be on the order of two to ten times more expensive than the other options discussed. Therefore, it appears that exsitu vitrification would be prohibitively expensive in this application.

Recycling/recovery process options include waste segregation, secondary lead smelters, plastic recyclers, incineration/supplemental fuel feed source, and soil/acid washing technologies. Several of these technologies could be used simultaneously to handle the variety of materials present on this site. A number of proprietary segregation techniques (Canonie, 1993; USEPA, 1992) could be utilized on the waste piles and remote fill. Once segregated, the various materials could be handled as follows: Smelter slag could be shipped to a secondary lead smelter; the hard rubber battery casing could be sent off-site for use as a supplemental fuel feed if a suitable user is identified (Center for Hazardous Materials Research, 1993); and the plastic could be sent to a plastic recycler. However, both the hard rubber and the plastic would first need to be treated with some sort of washing technique (Canonie, OHM) in order to be able to pass TCLP prior to being shipped off-site for recycling/disposal. Canonie is attempting to do this at the Gould Site in the state of Oregon. To date, Canonie has been unable to meet the TCLP requirement (USEPA, Region X, personal communication). According to Canonie and the USEPA Region X (personal communication) unless the material can pass TCLP, the hard rubber and plastic cannot be used as either a supplemental fuel feed, or be accepted by a recycler. If the battery casing material cannot be washed to pass TCLP, then either stabilization and disposal at an appropriate landfill, or incineration at a RCRA TSD facility will be required. Several secondary smelters, owned by Exide Corporation, have been identified that have a RCRA Part B permit as part of their operating license (Center For Hazardous Materials Research, 1993). The RCRA Part B permit would allow these facilities to accept the hazardous material contained in the waste piles on the NL/Taracorp site, as is, without meeting the TCLP requirements. The waste pile material would be added to the feed stream for the secondary smelter and the lead reclaimed.

The lead contaminated soil could be treated with a soil/acid washing technique to remove lead to below the required action levels. This would be done most effectively at the main industrial site. Excavated soil awaiting treatment would be stored in rolloff boxes to minimize exposure potential and to allow for easy transport and handling. A proprietary acid washing process, developed by Earth Treatment and Technology Inc., claims to lower lead levels in the soil to concentrations that are well below the required action levels for the NL Site, and to recover up to 99% of the soil (including fines) after the washing process is complete (Earth Treatment Technologies, personal communication). The soil could then be replaced onto the affected properties. To date, however, this technique has only been applied on a pilot or demonstration scale, so that the feasibility of full scale implementation of the process has not been proven.

A developing bioremediation technology for lead contaminated soil is phytoremediation (DuPont Corporation, 1993). This process uses biokinetics uptake of lead by plants from soil. A non-pollinating species of ragweed has been shown to be particularly effective. However, this technology has only been applied at a test scale. The types of plants that have been shown to be effective in this application are all varieties of weeds. This would limit applications of this technology to non-residential and industrial areas. Additionally, it is not known if the rate of uptake of lead by the plants would occur quickly enough to be potentially applicable at a heavily contaminated site like the NL/Taracorp site. There would also be the problem of disposing of the plant material after periodic harvesting. This would involve either landfilling or incineration. It has not been determined if the harvested plant material would need to be characterized as hazardous waste.

Based on the screening results discussed above, conventional stabilization, recycling, and recovery processes appear to be potentially applicable and will be considered further.

2.3.4.2 Groundwater

Treatment actions for groundwater could include both physical treatment, such as filtering, to remove suspended metals, and chemical treatment, using of additives to precipitate out dissolved metals. Both physical and chemical treatment could be implemented through the installation of an on-site pump and treat system, or by off-site treatment at the local POTW, or at a RCRA disposal facility. Of these options, treatment at the local POTW would be easiest to implement. Extracted groundwater could be pumped directly into the combined sewer system for treatment as part of the POTW's daily waste stream. The anticipated volume could be easily handled by the existing POTW facilities. The other two process options, an on-site treatment system, and treatment at a RCRA facility could be utilized, but would be more costly to implement. An on-site treatment system may be necessary if the extracted groundwater exceeds the acceptance requirements for the POTW. However, based on the Specific Pollutant Limitations listed in the Granite City Sewer Use Ordinance (Ordinance No. 3819), and on the RI/FS and PDFI groundwater sampling results, it appears unlikely that pretreatment would be necessary.

Based on the screening results, treatment at the local POTW and an on-site treatment system appear to be potentially applicable to the site and will be considered further.

2.3.5 Disposal Actions (All Media)

Disposal Actions for soil include disposal at: an off-site RCRA compliant TSD facility, a special waste landfill, and an on-site landfill cell (to be constructed). Disposal actions for groundwater include disposal to the local POTW, release to the Mississippi River, and deep bedrock injection. The later two options would be difficult to implement in terms of logistics, permitting, interagency approval, and public support.

Both on-site and off-site landfill options appear to be potentially applicable, and will be considered further. Of the disposal options for groundwater, only discharge to the local POTW appears to be potentially applicable and will be considered further.

3.0
DEVELOPMENT AND SCREENING OF ALTERNATIVES

The screening procedure discussed in Section 2 eliminated those remedial technologies and process options that were: 1) not protective of the human health or the environment, or 2) did not appear to be technically or economically feasible. This procedure resulted in the selection of several representative process options that can be combined into the following media and location specific remedial alternatives :

Solid Media - Main Industrial Area:

M-A) Source Removal to On-Site Landfill (Consolidation)

M-B) Source Removal to On-Site Landfill; On-Site Treatment of Material Characterized as Hazardous Waste

M-C1) Source Removal to Off-Site Landfill; Off-Site Treatment of Hazardous Waste

M-C2) Source Removal to Off-Site Landfill; On-Site Treatment of Hazardous Waste

M-D) Source Removal with On-Site Sorting, Treatment; Off-Site Recycling; Disposal

Solid Media - Remote Fill Areas:

RF-A) Removal of Remote Fill from Residential Areas; Treatment of Remote Fill Characterized as Hazardous; Capping of Remote Fill in Alleys and Driveways

RF-B) Removal of Remote Fill from All Remote Fill Areas to Either On-Site or Off-Site Landfill; Treatment of Remote Fill Characterized as Hazardous

Groundwater Media:

G-A) Monitoring and Natural Attenuation

G-B) Groundwater Containment on the Main Industrial Site by Pumping and Disposal into the Local POTW; Monitoring and Natural Attenuation in the Remote Fill Areas

G-C) Groundwater Containment on the Main Industrial Site Through a Combination of Installation of a Slurry Wall and Pumping and Disposal into the Local POTW; Monitoring and Natural Attenuation in the Remote Fill Areas

Since it is not necessary for this second addendum to address the remedy for the adjacent residential areas, it is assumed that the remedy specified in the ROD (ROD alternative H) is still appropriate.

Common to all of the remedial alternatives that will be discussed are a series of institutional controls . These comprise a base group of actions that can be easily implemented as part of any of the alternatives outlined. It should be noted that the alternatives presented do not represent all possible combinations of options. While the alternatives presented do represent a broad spectrum of remedial solutions, the option that is ultimately implemented for this site may be a combination of process options that differs from the series of alternatives discussed here. A series of Remedial Alternatives Matrices outlining the components of each alternative is presented in **Tables 3-1**, **3-2**, and **3-3**.

3.1 DISCUSSION OF REMEDIAL ALTERNATIVES

3.1.1 Solid Waste Media - Main Industrial Area

3.1.1.1 Alternative M-A: Source Removal to On-Site Landfill (Consolidation)

Alternative M-A would be applied to the main industrial site and would include excavation, capping, consolidation, and containment technologies, as well as institutional and monitoring activities. Long-term air monitoring would be required.

To implement Alternative M-A on the main industrial site, the contents of the SLLR pile would be excavated and combined with the main Taracorp pile. This new section of the pile would have a bottom liner consisting of a 3 foot layer of compacted clay installed prior to the addition of the excavated material. Contaminated soil located in this new section would be removed prior to installation of the liner. The combined pile would be graded and capped with a multi-media cap. The construction and capping would require that the pile extend onto portions of the Trust 454, BV&G, and Rich Oil properties so that the appropriate grading and sloping requirements could be met. For the remaining unpaved areas of the main industrial site, soil with a total lead content in excess of 1000 mg/kg and soil containing hard rubber battery casing material would be excavated as required by the ROD, and added to the new lined section of the main Taracorp pile. The excavated area would then be restored with clean soil and capped with either sod or asphalt, in accordance with usage.

3.1.1.2 Alternative M-B: Source Removal to On-Site Landfill; On-Site Treatment of Material Characterized as Hazardous Waste

Alternative M-B would be applied to the main industrial site and would include excavation, on-site disposal, and treatment technologies, as well as institutional controls and monitoring activities. Long-term air monitoring would be required.

To implement Alternative M-B on the main industrial site, the contents of the Taracorp and SLLR piles would be excavated, stabilized on-site, and disposed of into a solid waste landfill to be constructed on-site in accordance with 35 IAC Part 811, Subpart C. As with Alternative M-A, the construction and capping of such a landfill would require that it extend onto portions of the Trust 454, BV&G, and Rich Oil properties so that the appropriate grading and sloping requirements could be met. For the unpaved areas of the main industrial site, soil with greater than 1000 mg/kg total lead and soil containing hard rubber battery casing material would be excavated as required by the ROD, stabilized, if necessary, and disposed of into the new on-site landfill. The treatment technology utilized must stabilize the material to be less than the hazardous waste characteristic requirement for lead (TCLP-Lead < 5 mg/L).

3.1.1.3 Alternative M-C1: Source Removal to Off-Site Landfill; Off-Site Treatment of Hazardous Waste

Alternative M-C1 would be applied to the main industrial site and would include excavation, off-site disposal, and treatment technologies, as well as monitoring activities. Long term air monitoring would not be required.

To implement Alternative M-C1 on the main industrial site, the contents of the Taracorp and SLLR piles would be excavated and removed to a hazardous waste TSD facility for stabilization and disposal. For the unpaved areas of the main industrial site, soil with greater than 1000 mg/kg total lead and soil containing hard rubber battery casing material would be excavated and removed to a TSD facility for stabilization, if necessary, and disposed of at either a TSD facility or special waste landfill, as appropriate.

3.1.1.4 Alternative M-C2: Source Removal to Off-Site Landfill; On-Site Treatment of Hazardous Waste

Alternative M-C2 would be applied to the main industrial site and would include excavation, on-site treatment, and off-site disposal, as well as monitoring activities. Long term air monitoring would not be required.

To implement Alternative M-C2 on the main industrial site, the contents of the Taracorp and SLLR piles would be excavated, treated on-site, and removed to an appropriate off-site landfill for disposal. For the unpaved areas of the main industrial site, soil with greater than 1000 mg/kg total lead and soil containing hard rubber battery casing material will be excavated, treated on-site, and removed to a special waste landfill for disposal. The treatment technology utilized must stabilize the material to be less than the hazardous waste characteristic for lead (TCLP-Lead < 5 mg/L).

3.1.1.5 Alternative M-D: Source Removal; On-Site Sorting and Treatment; Off-Site Recycling and Either On-Site or Off-Site Disposal

Alternative M-D would be implemented on the main industrial site and would include excavation, on-site or off-site disposal, off-site recycling, and on-site and off-site treatment technologies, as well as institutional and groundwater monitoring activities. Long term air monitoring would be required if on-site disposal is implemented.

To implement Alternative M-D on the main industrial site, the contents of the Taracorp and SLLR piles would be excavated and, if necessary, segregated on-site. If an acceptable recycling facility, such as a secondary smelter with a RCRA Part B or interim status permit is identified that will accept the waste pile material, the excavated material could be transported to that facility for recycling without sorting or treatment. If segregation of the material is required, then the slag material would be shipped to a secondary smelter for lead recovery. The hard rubber and plastic battery casing material would require a wash treatment in order to pass TCLP-Lead. This would also be performed on-site. The hard rubber battery casing material could then be sent off-site for use as secondary fuel feed if a suitable user is identified, and the plastic could be recycled. If the hard rubber and plastic battery casing material cannot be cleaned to pass TCLP requirements or if a suitable user and recycler cannot be found, it would need to be stabilized, and disposed of at either an on-site or off-site special waste landfill. Any remaining material that could not be recycled would be stabilized on-site and disposed of at either an on-site or off-site special waste landfill.

For the unpaved areas of the main industrial site, soil and fill containing battery casing material and/or with greater than 1000 mg/kg total lead will be excavated as required by the ROD and segregated on-site. Slag material, hard rubber, and plastic would be shipped to a secondary smelter with a RCRA Part B or interim status permit for lead recovery, if an acceptable facility is identified. If a non-RCRA permitted industrial furnace and/or recycler is used, the hard rubber and plastic battery casing material would require a wash treatment in order to pass TCLP-Lead. This would also be performed on-site. The hard rubber battery casing material could then be sent off-site for use as secondary fuel feed if a suitable user is identified, and the plastic would be recycled. If these materials can not be adequately cleaned to pass TCLP, then they would need to be stabilized and disposed of in an on-site or off-site special waste landfill. Remaining material that could not be recycled would be stabilized on-site and disposed of at either an on-site or off-site special waste landfill. The excavated areas would then be restored with clean soil from off-site and capped with sod or asphalt, in accordance with usage.

3.1.2 Solid Media - Remote Fill Areas

3.1.2.1 Alternative RF-A: Removal of Remote Fill from Residential Areas, Treatment of Remote Fill Characterized as Hazardous; Capping of Remote Fill in Alleys and Driveways

In the residential remote fill areas, soil or fill with greater than 500 mg/kg total lead and fill material containing hard rubber battery casing material would be excavated. If possible, hazardous and nonhazardous material would be segregated. The material characterized as hazardous by TCLP would be stabilized either on-site or off-site. This material could then be disposed of into either an on-site or off-site landfill. Non-hazardous material would be taken directly to the landfill for disposal. The excavated areas would then be restored with clean soil or fill and capped with either sod, rock, asphalt, or concrete, depending on usage.

Remote fill material in alleys, parking lots, and driveways would be covered with an asphalt cap to eliminate any potential exposure pathway. Soil removal at these sites would be limited to excavation required for subgrade preparation. Any soil removed would be treated if hazardous and then disposed of into either an on-site or off-site landfill.

3.1.2.2 Alternative RF-B: Removal of Remote Fill from All Remote Fill Areas to Either On-Site or Off-Site Landfill; Either On-Site or Off-Site Treatment of Remote Fill Characterized as Hazardous

In all remote fill areas, soil or fill with greater than 500 mg/kg total lead and fill material containing hard rubber battery casing material would be excavated. If possible, hazardous and nonhazardous material would be segregated. The material characterized as hazardous by TCLP would be treated either on-site or off-site. The stabilized material would be disposed of either at the main industrial area landfill or at a special waste disposal landfill. Non-hazardous material would be taken directly to the on-site or off-site landfill for disposal.

The excavated areas would then be restored with clean soil or fill and capped with either sod, asphalt, rock, or concrete, in accordance with usage.

3.1.3 Groundwater Media:

3.1.3.1 Alternative G-A: Monitoring and Natural Attenuation

Groundwater action would consist of long term monitoring, usage restriction, and natural attenuation. Additional monitoring wells for the main industrial area downgradient of the existing wells would be required to identify the extent of contamination. Additional monitoring wells would be required for the remote fill areas since there are no monitoring wells in these areas at the present time.

3.1.3.2 Alternative G-B: Groundwater Containment on the Main Industrial Site by Pumping and Disposal into the Local POTW; Monitoring and Natural Attenuation in the Remote Fill Areas

To contain groundwater contamination on the main industrial site, a series of on-site extraction wells would be installed to develop a cone of depression to control off-site groundwater flow. The water produced from the extraction wells would be treated on-site, if necessary, and would be disposed of into the local POTW to be treated as a part of the daily waste stream. Additional monitoring wells will be required to identify the extent of contamination. The wells should be located downgradient of the existing monitoring wells detecting high lead or cadmium levels.

Groundwater action for the remote fill areas would consist of long term monitoring, usage restriction, and natural attenuation. Additional monitoring wells would be required for the remote fill areas since there are no monitoring wells in these areas at the present time.

3.1.3.3 Alternative G-C: Groundwater Containment on the Main Industrial Site Through a Combination of Installation of a Slurry Wall and Pumping and Disposal into the Local POTW; Monitoring and Natural Attenuation in the Remote Fill Areas

To contain groundwater contamination on the main industrial site, a slurry wall would be installed around the perimeter of the main industrial property to prevent off-site migration of groundwater contamination. One or more on-site extraction wells would be installed to develop a cone of depression within the slurry wall to maintain an inward gradient and to prevent off-site groundwater flow. The water produced from the extraction wells would be treated on-site, if necessary, and would be disposed of into the local POTW to be treated as a part of the daily waste stream.

Groundwater action for the remote fill areas would consist of long term monitoring, usage restriction, and natural attenuation. Additional monitoring wells would be required for the remote fill areas since there are no monitoring wells in these areas at the present time.

3.2 SCREENING OF ALTERNATIVES

The goal of the screening process for remedial alternatives is to eliminate alternatives that are significantly less implementable or more costly than comparable effective alternatives. The major criteria considered in the screening process are effectiveness, ease of implementation, and cost.

The factors included under the criterion of effectiveness are:

- The overall reduction in contaminant toxicity, mobility, volume of waste
- Long term permanence
- Short term risks during implementation

Remedial alternatives that do not protect human health and the environment to an acceptable degree will be eliminated from further consideration during this initial screening process.

Implementability is associated with the difficulty in constructing, operating, and maintaining a given remedial alternative. The pertinent technical, administrative, and logististical concerns will be assessed to characterize the implementability of each alternative. Alternatives that appear to be unduly difficult or are more time consuming to implement than a comparable effective remedy will not be considered beyond the initial screening.

Cost factors include the capital costs required to implement and complete the remedial alternative, plus required continuing operating and maintenance costs. Cost will be used to eliminate those alternatives that would cost significantly more to attain the same level of protection.

3.2.1 Effectiveness

Each of the remedial action alternatives for the main industrial site and for the remote fill areas would address the potential risks to both the surrounding population and to the environment through a combination of containment and treatment technologies. The remedial response objectives for soil and for the on-site waste piles would be achieved by each of the proposed alternatives. However, Alternative M-A for the main industrial site and Alternative RF-A for the remote fill areas would only cap some or all of the contamination in place, making the long term effectiveness questionable. However, this problem will be addressed by O&M activities.

For groundwater contamination, Alternative G-A consists of monitoring and natural attenuation. If it is necessary to contain groundwater contamination on-site, then either Alternatives G-B and G-C would need to be implemented.

3.2.1.1 Soil/Waste Media - Main Industrial Site

Alternative M-A would reduce the potential for direct contact with contaminants and the potential for transport of contaminants by surface water or groundwater by consolidation and capping of the contaminated areas present on the main industrial site. The installation of a multimedia cap would eliminate direct contact of precipitation and run-on with contaminated material. Capping would also eliminate the migration of contaminants via the air pathway, and greatly reduce the potential for short term impact to human health and the environment.

Since this alternative does not require any of the contaminated material to be stabilized, there would be some potential long term exposure risks. Therefore, long-term monitoring and maintenance would be required.

Alternative M-B would provide an additional level of protection over Alternative M-A by treatment of material that is characterized as hazardous. The piles would be excavated, treated, and contained in a solid waste landfill. The excavated areas would be restored with clean topsoil and sod, and/or rock, asphalt, or concrete. This would control the potential for either direct contact with or migration of contaminants in solid media.

The potential for short term impacts to human health and the environment would be greater in Alternative M-B due to the possible generation of contaminated dust and the potential for storm water runoff during the excavation process. Appropriate dust control, respiratory protective measures, and storm water run-off control would be required.

Since Alternative M-B would require material characterized as hazardous to be stabilized, there would be some reduction in long term potential exposure risks. However, long-term monitoring and maintenance would still be required.

<u>Alternatives M-C1 and M-C2</u> would provide an additional level of protection over Alternatives M-A and M-B for the main industrial site by requiring that the hazardous material be stabilized at the main industrial site, or at an off-site TSD and disposed of at an appropriate off-site landfill. The excavated areas would be restored with clean topsoil and sod, or rock asphalt, or concrete. This alternative would eliminate the potential for either direct contact with or migration of contaminants in solid media in these areas, and would remove the contamination on the main industrial site. Due to the potential for residual contamination, long-term monitoring and maintenance would be required.

The potential for short term impacts to human health and the environment would be greater than in Alternative M-A due to the potential for generation of contaminated dust, the potential for storm water run-off during the excavation process, and transportation to treatment and disposal facilities. Potential for short-term impacts would be greater for Alternative M-C2 than M-C1 due to the potential for generation of additional contaminated dust during the on-site treatment activities. Appropriate dust control, respiratory protective measures, and run-off control would be required.

<u>Alternative M-D</u> would also provide an additional level of protection over Alternatives M-A and M-B by removal of the contaminated material. This would include the contaminated material contained in both the existing waste piles and the surficial soils. All sorting and treatment of the contaminated material would be conducted at the main industrial site, with the non-soil material being recycled to the extent possible. Because it would minimize the

amount of material to be landfilled, Alternative M-D would be preferable to Alternatives M-A, M-B, and M-C. By removing the contamination from the site, this alternative would eliminate the potential for either direct contact with, or migration of contaminants from solid media on-site. Long term exposure risks would be minimal on-site since the source of the contamination would be removed. Long term risks would be further reduced by minimizing off-site disposal.

The potential for short term impacts to human health and the environment would be greater than in Alternatives M-A, M-B, and M-C due to the generation of contaminated dust during the excavation, sorting, and recycling process, and during transportation to recycling and disposal facilities. Appropriate dust control and respiratory protective measures would be required.

3.2.1.2 Soil Media - Remote Fill Areas

Alternative RF-A would reduce the potential for direct contact with contaminants and the potential for transport of contaminants to groundwater by capping or removal of the affected remote fill areas. Removal and capping would also eliminate the migration of contaminants via the air pathway, and greatly reduce the potential for short term impact to human health and the environment. Due to the potential for damage to the cap in the alleys and driveways, long-term monitoring and maintenance would be required for these areas.

Alternative RF-B would provide an additional level of protection over Alternative RF-A by removal of the contaminated material to either on-site or off-site disposal facilities. This alternative would eliminate the potential for either direct contact with or migration of contaminants from solid media. Long term exposure risks on-site would be minimal since the source of the contamination would be removed.

The potential for short term impacts to human health and the environment would be greater than in Alternative RF-A due to the additional excavation in alleys and driveways, and the transportation of additional material to treatment and disposal facilities. Appropriate dust control, respiratory protective measures, and run-off control would be required.

3.2.1.3 Groundwater Media

Alternative G-A would not actively address the issue of groundwater contamination, but rather, would monitor groundwater contamination levels for the main industrial area and remote fill areas, and monitor the progress of natural attenuation.

Alternative G-B would add containment and treatment of groundwater contamination. By developing an on-site cone of depression through the use of extraction wells, contaminated groundwater would be contained on the main industrial site. Treatment of the extracted groundwater at the NL site, if necessary, and at the local POTW would minimize residual risk prior to final release into the Mississippi River.

For the remote fill areas, groundwater contamination would be remediated by natural attenuation.

The potential for short term impacts to human health and the environment would be greater than in Alternative G-A due to the generation and handling of contaminated groundwater and the increased chance of either an on-site or off-site release. Appropriate spill prevention, containment, and controls would be required.

Long-term groundwater monitoring for the main industrial area and the remote fill areas would be required.

Alternative G-C would add a slurry wall around the perimeter of the main industrial property to prevent off-site flow. One or more extraction wells would be installed within the slurry wall to maintain an inward gradient. Treatment of the extracted groundwater at the NL site, if necessary, and at the local POTW would minimize residual risk prior to final release into the Mississippi River.

For the remote fill areas, groundwater contamination would be remediated by natural attenuation.

The potential for short term impacts to human health and the environment in Alternative G-C would be greater than in Alternative G-A due to the generation of contaminated groundwater and the increased chance of either an on-site or off-site release. However, the slurry wall would be more effective at preventing an off-site release than Alternative G-B. Appropriate containment controls would be required.

Long term groundwater monitoring for the main industrial area and remote fill areas would be required.

3.2.2 Implementability

Implementability addresses the difficulty in constructing, operating, and maintaining a given remedial alternative. The pertinent technical, administrative, and logistical concerns, as well as the time required for implementation will also affect the implementability of an alternative.

3.2.2.1 Soil/Waste Media - Main Industrial Area

Alternative M-A can be implemented in a relatively short time frame, since excavation and hauling is limited to the main industrial site. Additional security fencing could be installed relatively quickly. However, the site access restriction measures that would be implemented would require indefinite long term maintenance.

To implement Alternative M-A, it is assumed that access to the Trust 454, BV&G, and Rich Oil properties would be obtained to allow for expansion and proper slope design of the pile and capping. However, the consolidation of contaminated materials on the main industrial site would facilitate the implementation of institutional controls. The cap and access restrictions such as fencing would require indefinite long term maintenance at the main industrial site. The multi-media cap that would be installed over the consolidated Taracorp pile would require indefinite long-term maintenance. This alternative would involve extensive reworking of the Taracorp pile to meet slope requirements.

Alternative M-B uses the excavation, treatment, consolidation, capping, and bottom liner installation procedures that are incorporated into some or all of the alternatives. These procedures use proven techniques and standard construction equipment, and should be relatively easy to implement in a relatively short time frame. To implement Alternative M-

B, it is assumed that access to the Trust 454, BV&G, and Rich Oil properties would be obtained to allow the necessary room for expansion and proper slope design of the pile and capping. However, the consolidation of contaminated materials on the main industrial site would facilitate the implementation of institutional controls. The cap, and access restrictions such as fencing, would require indefinite long term maintenance at the main industrial site. The multimedia cap and the leachate collection system that would be installed in the landfill would require indefinite long term maintenance.

Alternatives M-C1 and M-C2 may require significantly more time to implement than Alternative M-B due to the additional, permitting and material transport that is required. Alternative M-C2, which includes on-site treatment, uses proven treatment techniques and standard construction equipment. This alternative should be relatively easy to implement in a relatively short time frame. The excavation and removal of contaminated material would eliminate the need for long term monitoring in these areas.

Alternative M-D would require more time to implement than Alternatives M-A, M-B, M-C1, or M-C2, due to the additional on-site sorting and treatment. Alternative M-D would be logistically more difficult to implement due to the variety of on-site facilities and equipment required to accomplish the necessary sorting and treatment, and due to the variety of destinations that the segregated material would need to be delivered to either for recycling or disposal. However, removal of the contaminated material from the site would minimize the need for on-site institutional controls by restoring the remediated areas. Long term monitoring would still be required to verify the effectiveness of the remedy.

3.2.2.2 Soil Media - Remote Fill Areas:

Alternatives RF-A and RF-B use the excavation, consolidation, and capping procedures that are incorporated into some or all of the alternatives. These procedures use proven techniques and standard construction equipment, and should be relatively easy to implement in a relatively short time frame. Institutional controls for Alternative RF-A which includes capping of the alleys and driveways would not be possible due to logistical and legal difficulties. A commitment to regular long term maintenance and upkeep of the respective caps would be required.

3.2.2.3 Groundwater Media

Alternative G-A would be easily implemented in a short time frame. However, long-term monitoring would be required.

Alternative G-B would be easy to implement in a short time frame. It would require the installation and maintenance of extraction wells, a collection system, access to the local POTW for an extended time-frame (possible up to 30 years or more), and an on-site water pre-treatment facility if the produced groundwater cannot meet the acceptance criteria of the POTW.

Alternative G-C would take longer to implement than Alternative G-A or G-B due to the time to install the slurry wall. Once the slurry wall is in place, the operation and maintenance requirements would be similar to Alternative G-B.

3.2.3 Cost

Preliminary cost estimates including capital and annual operation costs were developed for each alternative. A detailed breakdown for each alternative is included in **Tables 3-4** through **3-17**. A discussion of the cost estimating process is presented in **Section 4.3.7**. While the second Addendum does not address the remedial alternatives for the adjacent residential areas or the Taracorp drums, it is necessary to present cost estimates for these aspects of the remedy so that comparisons may be made between complete remedial packages. For completeness these costs are included in **Tables 3-18, 3-19,** and **3-20**. Based on the Specific Pollutant Limitations listed in the Granite City Sewer Use Ordinance (Ordinance No. 3819), it is assumed that a groundwater pre-treatment system will not be required for Alternatives G-B, and G-C. Therefore, this expense has not been included in the cost estimates for these Alternatives. The estimated capital cost of implementing each alternative is as follows:

Main Industrial Site - Solid Media Capital	Capital Costs	Time to Construct
Alternative M-A	$4,510,000	9-15 months
Alternative M-B	$28,700,000	12-18 months
Alternative M-C1	$64,800,000	6-12 months
Alternative M-C2	$34,600,000	10-16 months
Alternative M-D*	$87,400,000	11-17 months
Remote Fill Areas - Solid Media		
Alternative RF-A		6-8 months
(On-Site Treatment and Disposal)	$1,010,000	
(On-Site Treatment and Off-Site Disposal)	$999,000	
(Off-Site Treatment and Disposal)	$1,110,000	
Alternative RF-B		9-12 months
(On-Site Treatment and Disposal)	$2,020,000	
(On-Site Treatment and Off-Site Disposal)	$2,180,000	
(Off-Site Treatment and Disposal)	$2,610,000	
Groundwater		
Alternative G-A	$53,600	1 month
Alternative G-B	$466,000	2-4 months
Alternative G-C	$16,600,000	6-8 months

* Cost for M-D may be considerably lower if waste piles can be processed at a secondary lead smelter.

A complete summary of capital costs, operation and maintenance costs, and total costs is included in **Section 4.3.8**.

3.2.4 Summary of Alternative Screening

In summary, while all of the proposed alternatives can be implemented in terms of technical and logistical requirements, the levels of effort and time required, as well as the cost for implementation, increases as the alternatives become more involved. However, the more involved alternatives generally offer more permanent solutions, with less residual risk to human health and the environment. Because the alternatives discussed are media specific, a combination of alternatives is required to meet the remedial objectives. The combination of alternatives selected must achieve an acceptable level of residual risk for a reasonable cost.

4.0 DETAILED ANALYSIS OF ALTERNATIVES

4.1 INTRODUCTION

The purpose of the detailed analysis of alternatives is to present the relevant information that is necessary for the decision process of selecting a remedial solution. The advantages and disadvantages of each alternative can then be compared and evaluated in order to select an appropriate remedial solution. Each alternative is assessed against the evaluation criteria described in the Guidance Document. These criteria are:

Protection of Human Health and the Environment: assessment of the ability to protect human health and the environment at the site.

Compliance with ARARs: assessment of the ability to comply with ARARs, or the basis for a waiver and how it is justified. The assessment includes information from advisories, criteria, and guidance that agencies have agreed is appropriate for the site.

Long Term Effectiveness: assessment of the ability to protect human health and the environment after response objectives have been met. Specific factors to be considered include the magnitude of the remaining risk, the adequacy of controls, and the reliability of controls.

Reduction of Toxicity, Mobility, and Volume: assessment of the ability to meet the required performance standards and action levels for the site. Specific factors to be considered include: treatment processes; the amount of hazardous materials to be treated; the expected reduction in toxicity, mobility, or volume; the irreversibility of treatment; and the type and quantity of residual material.

Short Term Effectiveness: assessment of the ability to protect human health and the environment during the construction and implementation phase until the response objectives have been met.

Implementability: assessment of the technical and administrative feasibility of remedial alternatives and the availability of required resources.

Cost: assessment of the capital, and operation and maintenance costs of each alternative, including an evaluation in terms of present worth costs.

State Acceptance: assessment of the regulatory agencies' apparent preferences or concerns relative to remedial alternatives.

Community Acceptance: assessment of the community's apparent preferences or concerns relative to remedial alternatives.

Each of the remedial alternatives will be individually evaluated against the first seven criteria. The final two criteria, state acceptance and community acceptance will be evaluated following comment on the FS addendum and proposed plan.

4.2 INDIVIDUAL ANALYSIS OF ALTERNATIVES

4.2.1 Soil/Waste Media - Main Industrial Area

4.2.1.1 Alternative M-A: Source Removal to On-Site Landfill (Consolidation)

The implementation of Alternative M-A would involve excavation, on-site disposal, capping, consolidation, and containment technologies, as well as institutional and monitoring activities. Contaminated material from the rest of the industrial site will be excavated and consolidated with the Taracorp pile in an on-site landfill. Due to the size and design requirements of the enlarged pile, it would be necessary to utilize the Trust 454, BV&G, and Rich Oil properties to allow room for appropriate sloping and grading of the pile. The new sections of the pile will have a clay liner installed prior to the addition of the excavated material. The excavated areas would be restored in accordance with usage.

Protection of Human Health and the Environment: By excavating the contaminated soils and consolidating the material in an on-site landfill, the exposure potential should be controlled. With respect to the Taracorp pile, Alternative M-A is considered to be protective of human health and the environment by limiting contaminant migration via surface water and air pathways, and by limiting the potential for direct contact with contaminants. Long term maintenance of the multimedia cap covering the Taracorp pile will be required, including periodic inspections. Capping would also retard leaching of contaminants, therefore, increasing the period of time necessary to remediate groundwater.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- For air, the ambient air quality standard for lead is 1.5 ug/m^3 (quarterly average) (35 IAC Part 243: Air Quality Standards)

- For closure of the landfill (area of contamination), the final cover design should meet the closure and post-closure requirements for a landfill disposal facility (35 IAC Section 724.410 Closure and Post-Closure Care).

- During construction and/or capping activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

- For on-site procedures using large amounts of water, such as washing and decontamination, local POTW discharge limits would apply (35 IAC Part 310: Pretreatment Programs; Granite City Sewer Use Ordinance No. 3819)

Other regulatory requirements that may be judged relevant and appropriate are listed in **Table 1-6.**

The multimedia cap for the on-site landfill could be constructed to meet the requirements of the ARARs. Excavation and consolidation of contaminated material from the main industrial site could also be conducted in accordance with these ARARs. Air monitoring and dust control would be required.

Long Term Effectiveness: The long term effectiveness of Alternative M-A for the Taracorp pile would be relatively high since it would be effective in reducing infiltration and percolation through the pile, and would greatly reduce the potential for direct contact with waste materials. Long term management of the landfill cap would be required to insure its integrity. This would include regular mowing and fertilization, as well as reseeding and repair when required. The semi-annual groundwater and air monitoring previously discussed would also be required.

Since the contamination would be excavated and removed, the remedial actions prescribed for the unpaved industrial areas (excluding the Taracorp pile) are considered to have high long term effectiveness. The removal of the contamination and subsequent restoration would minimize the need for long term monitoring and maintenance in these areas. Capping would also retard leaching of contaminants, therefore, increasing the period of time necessary to remediate groundwater.

Reduction of Toxicity, Mobility, or Volume: The installation of the multimedia cap over the enlarged and reconfigured Taracorp pile would significantly reduce the mobility of the contamination by eliminating run-on and direct contact of precipitation with waste materials and by preventing the release of airborne contaminants.

Contaminant mobility, toxicity, and volume would be controlled at the remainder of the main industrial site by consolidating the contaminated material in an on-site landfill.

Short Term Effectiveness: Alternative M-A requires excavation of contaminated materials from the main industrial site and significant reconfiguration of existing pile to meet scope requirements. This would create potential short term risks to human health and the environment by the potential generation of contaminated dust. Air monitoring and dust control would be required during all excavation, transportation, consolidation, grading and capping operations.

Implementability: Alternative M-A can be implemented using standard construction techniques. Heavy equipment would be required for excavation and restoration on the industrial site, to consolidate the SLLR pile with the Taracorp pile, and to grade and reconfigure the enlarged pile. The multimedia cap could also be installed using standard construction techniques, although care must be taken while installing the synthetic membranes. Since the contents of the existing piles would not be stabilized, continuing maintenance and monitoring at the main industrial site would be required for an indefinite period of time.

Monitoring and access restrictions required by Alternative M-A are readily implementable. The cap and cover could be inspected with little difficulty, but would need to be completed on a regular basis. Surface soil could be sampled periodically to monitor for the possible effects of erosion and frost upheaval. The deed restrictions and restrictive covenants that would be required are also implementable, but would require legal and government review before being enacted. Access to and use of the Trust 454, BV&G, and Rich Oil properties would be required to successfully implement this alternative.

Costs: Total capital costs for Alternative M-A are estimated to be $4,510,000. Total annual operating costs are estimated to be $18,700 (no adjustment for inflation). Total present worth for 30 years of operation, assuming 5% interest, is estimated to be $4,800,000. A detailed cost estimate for Alternative M-A is presented in **Table 3-4** . It is estimated the time required to implement Alternative M-A will range from 9 to 15 months.

4.2.1.2 Alternative M-B Source Removal to On-Site Landfill, with On-Site Stabilization of Hazardous Waste

The implementation of Alternative M-B would involve excavation, treatment, on-site disposal, capping, consolidation, and containment technologies, as well as institutional and monitoring activities. Contaminated material contained in the waste piles, as well as material from the rest of the industrial site, will be excavated, transported to a staging area at the main industrial site, stabilized if necessary, and placed in an on-site solid waste landfill. Due to the size and design requirements of the on-site landfill, it would be necessary to utilize the Trust 454, BV&G, and Rich Oil properties to allow room for appropriate sloping and grading of the pile. The excavated areas will be restored in accordance with usage.

Protection of Human Health and the Environment: With respect to the Taracorp pile, Alternative M-B is considered to be protective of human health and the environment. Stabilization and capping of the contaminated material limits contaminant migration via surface water, groundwater, and air pathways. It also limits the potential for direct contact with contaminants. Long term maintenance of the cap covering the new on-site landfill will be required, including periodic inspections.

<u>Compliance with ARARs</u>: ARARs that would be applicable are specified as the following:

- For the design of the solid waste landfill, the landfill should be equipped with a liner system consisting of a leachate drainage and collection system and a compacted earth or geocomposite liner and a final cover system (35 IAC Part 811, Subpart C: Putrescible and Chemical Waste Landfill)

- For waste characterized as hazardous, the treatment technique should stabilize the material to a level below the toxicity characteristics (TCLP-Lead < 5 mg/L) (35 IAC Part 721 Identification and Listing of Hazardous Waste)

- If treatment is conducted in tanks, the tank systems are applicable to RCRA treatment and storage regulations (35 IAC Part 724, Subpart J - Standards for Treatment, Storage, and Disposal Facilities - Tank Systems)

- For air, the ambient air quality standard for lead is 1.5 ug/m^3 (quarterly average) (35 IAC Part 243: Air Quality Standards)

- During construction, treatment, or capping activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

- For on-site procedures using large amounts of water, such as washing and decontamination, local POTW discharge limits would apply (35 IAC Part 310: Pretreatment Programs; Granite City Sewer Use Ordinance No. 3819)

Other requirements that may be judged as relevant and appropriate are listed in **Table 1-6.**

The landfill liner and cover systems could be constructed to meet the requirements of the ARARs. Air monitoring and dust control would be required during construction.

Long Term Effectiveness: The long term effectiveness of Alternative M-B on the Taracorp pile is considered to be relatively high due to the reduction in leaching potential. The cap would also prevent the release of airborne contaminants from the pile, and would greatly reduce the potential for direct contact with waste materials. The leachate collection and liner system would greatly reduce downward migration of contamination into the groundwater. Management of the cap and the liner system for an indefinite time period would be required to insure its integrity. This would include regular mowing and fertilization, as well as reseeding and repair when required. Long term air monitoring would also be required.

Since the contamination would be excavated and removed, the remedial actions prescribed for the rest of the industrial area would have high long term effectiveness.

Reduction of Toxicity, Mobility, or Volume: The installation of the cap and liner systems for the on-site landfill, in combination with the stabilization of hazardous waste, would significantly reduce the mobility of the contamination by eliminating run-on and direct contact of precipitation with waste materials, communication with groundwater, immobilization of the contamination, and preventing the release of airborne contaminants. This alternative would significantly reduce the toxicity of the waste materials, but, due to the required stabilization of hazardous material, would increase rather than reduce the volume.

Contaminant mobility, toxicity, and volume would be eliminated at the remainder of the main industrial site by removing the contamination to the Taracorp pile.

Short Term Effectiveness: Alternative M-B requires extensive excavation of contaminated materials from the main industrial site. It would also require excavation of the Taracorp pile. This would create potential short term risk to human health and the environment by the potential for generation of contaminated dust. Air monitoring and dust control would be required during all excavation, transportation, consolidation, grading and capping operations.

Implementability: Alternative M-B can be implemented using standard construction, and hazardous waste stabilization techniques. Heavy equipment would be required for excavation, treatment, landfill construction, and restoration of the industrial site. An on-site treatment facility would be required to stabilize the excavated material characterized as hazardous. The cap and liner systems could also be installed using standard construction techniques.

Since the contaminated material would be disposed of in an on-site landfill, continuing maintenance and monitoring of the landfill would be required for an indefinite period of time. Additional remedial action could be required if the landfill is not properly maintained.

Monitoring and access restrictions required by Alternative M-B are readily implementable. The cap and cover could be inspected with little difficulty. Surface soil could be periodically sampled to monitor for possible effects of erosion and frost upheaval. The deed restrictions and restrictive covenants required are also implementable, but would require legal and government review before being enacted. Access to and use of the Trust 454, BV&G, and Rich Oil properties would be required to successfully implement this alternative.

Costs: Total capital costs for Alternative M-B are estimated to be $28,700,000. Total annual operating costs are estimated to be $20,100 (no adjustment for inflation). Total present worth for 30 years of operation assuming 5% interest is estimated to be $29,000,000. A detailed cost estimate for Alternative M-B is presented in **Table 3-5** . It is estimated that the time required to implement Alternative M-B will range from 12 to 18 months. It should be noted that during interviews of current and former NL/Taracorp employees by USEPA, it has been mentioned that thallium may be present in the Taracorp pile. If this proves to be correct, it may alter the cleanup cost and method.

4.2.1.3 Alternative M-C1: Source Removal to Off-Site Landfill, with Off-Site Stabilization of Hazardous Waste

The implementation of Alternative M-C1 would involve excavation, off-site disposal, treatment, and restoration technologies, as well as institutional and monitoring activities. Contaminated material contained in the waste piles and the rest of the industrial site would be excavated and hauled to an appropriate off-site landfill for stabilization (if necessary) and disposal. The excavated areas would be restored in accordance with usage.

Protection of Human Health and the Environment: With respect to the Taracorp pile, Alternative M-C1 is considered to be protective of human health and the environment. By removing the contaminated material from the site, the exposure potential on the main industrial site should be controlled.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- For air, the ambient air quality standard for lead is 1.5 ug/m^3 (quarterly average) (35 IAC Part 243: Air Quality Standards)

- During excavation activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

- For transportation of wastes off-site, manifests will be required (35 IAC Part 722: Standards Applicable to Generators of Hazardous Waste; 35 IAC Part 723: Standards Applicable to Transporters of Hazardous Waste; 35 IAC Part 808: Special Waste Classifications; 35 IAC Part 809: Special Waste Hauling)

- For on-site procedures using large amounts of water, such as washing and decontamination, local POTW discharge limits would apply (35 IAC Part 310: Pretreatment Programs; Granite City Sewer Use Ordinance No. 3819)

Other requirements that may be judged relevant and appropriate are listed in **Table 1-6**.

Contaminated material could be excavated and transported during construction in accordance with these ARARs. Air monitoring and dust control would be required.

Long Term Effectiveness: The long term effectiveness of Alternative M-C1 would be high. The contaminated soil, fill, and waste material would be removed from the site, controlling the long term surface exposure risk.

Reduction of Toxicity, Mobility, or Volume: Contaminant mobility, toxicity, and volume would be eliminated at the remainder of the main industrial site by removing the contamination from the site. The volume of contaminants will increase at the disposal facility due to stabilization.

Short Term Effectiveness: Alternative M-C1 requires extensive excavation of contaminated materials from the main industrial site. It would also require excavation of the Taracorp pile. This would create potential short term risks to human health and the environment by the potential for generation of contaminated dust. Air monitoring and dust control would be required during excavation and transportation operations.

Implementability: Alternative M-C1 can be implemented using standard construction techniques. Heavy equipment would be required for excavation and restoration on the industrial site, and to remove the SLLR and Taracorp piles.

Monitoring activities required by Alternative M-C1 are readily implementable. No access restrictions would be required after remediation is complete.

Costs: Total capital costs for Alternative M-C1 are estimated to be $64,800,000. No annual operating costs are expected after the alternative is implemented. Total present worth for 30 years of operation assuming 5% interest is estimated to be $64,800,000. A detailed cost estimate for Alternative M-C1 is shown in **Table 3-6**. It is estimated that the time required to implement Alternative M-C1 will range from 6 to 12 months.

4.2.1.4 Alternative M-C2: Source Removal to Off-Site Landfill; On-Site Treatment of Hazardous Waste

The implementation of Alternative M-C2 would involve excavation, on-site treatment, off-site disposal, and restoration technologies, as well as institutional and monitoring activities. Contaminated material contained in the waste piles and the rest of the industrial site would be excavated, treated on-site if necessary, and hauled to an appropriate off-site landfill for disposal. The excavated areas would be restored in accordance with usage.

Protection of Human Health and the Environment: With respect to the Taracorp pile, Alternative M-C2 is considered to be protective of human health and the environment. By removing the contaminated material from the site, the exposure potential on the main industrial site should be controlled.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- For waste characterized as hazardous, the treatment technique should stabilize the material to a level below the toxicity characteristics (TCLP-Lead < 5 mg/L) (35 IAC Part 721 Identification and Listing of Hazardous Waste)

- If treatment is conducted in tanks, the tank systems are applicable to RCRA treatment and storage regulations (35 IAC Part 724, Subpart J - Standards for Treatment, Storage, and Disposal Facilities - Tank Systems)

- For air, the ambient air quality standard for lead is 1.5 ug/m^3 (quarterly average) (35 IAC Part 243: Air Quality Standards)

- During excavation and treatment activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

- For transportation of wastes off-site, manifests will be required (35 IAC Part 808: Special Waste Classifications; 35 IAC Part 809: Special Waste Hauling)

- For on-site procedures using large amounts of water, such as washing and decontamination, local POTW discharge limits would apply (35 IAC Part 310: Pretreatment Programs; Granite City Sewer Use Ordinance No. 3819)

Other regulatory requirements that may be judged relevant and appropriate are listed in **Table 1-6** .

Contaminated material could be excavated, treated, and transported during construction in accordance with these ARARs. Air monitoring and dust control would be required.

Long Term Effectiveness: The long term effectiveness of Alternative M-C2 would be high. The contaminated soil, fill, and waste material would be removed from the site, controlling the long term surface exposure risk.

Reduction of Toxicity, Mobility, or Volume: Contaminant mobility and toxicity, would be eliminated at the remainder of the main industrial site by removing the contamination from the site. However, the volume of material requiring disposal would be increased due to the stabilization process.

Short Term Effectiveness: Alternative M-C2 requires extensive excavation and treatment of contaminated materials from the main industrial site. It would also require excavation of the Taracorp pile and extensive on-site handling of contaminated material. This would create potential short term risks to human health and the environment by the potential for generation of contaminated dust. Air monitoring and dust control would be required during all excavation, transportation, treatment, and grading operations.

Implementability: Alternative M-C2 can be implemented using standard construction and hazardous waste stabilization techniques. Heavy equipment would be required for excavation and restoration on the industrial site, and to remove the SLLR and Taracorp piles. An on-site treatment facility would be utilized to stabilize the excavated material characterized as hazardous.

Monitoring activities required by Alternative M-C2 are readily implementable. No access restrictions would be required after remediation is complete.

Costs: Total capital costs for Alternative M-C2 are estimated to be $34,600,000. No annual operating costs are expected after the alternative is implemented. Total present worth for 30 years of operation assuming 5% interest is estimated to be $34,600,000. A detailed cost estimate for Alternative M-C2 is shown in **Table 3-7**. It is estimated that the time required to implement Alternative M-C2 will range from 10 to 16 months.

4.2.1.5 Alternative M-D: Source Removal; On-Site Sorting and Treatment; Off-Site Recycling and Disposal

The implementation of Alternative M-D on the main industrial site would involve excavation, on-site or off-site disposal, recycling, and on-site and off-site treatment technologies, as well as the institutional activities. If a recycling facility such as a secondary smelter with a RCRA Part B permit can be identified that will accept the waste pile material, the pile material will be excavated and transported directly to the smelter for recycling, without segregation or treatment. If a RCRA recycling facility cannot be found that will accept this material as is, then the contents of the waste piles and remote fill areas would be excavated, transported to a staging area at the main industrial site, and segregated. Slag material would be shipped to a secondary smelter for lead recovery. The hard rubber and plastic battery casing material would require a wash treatment, performed on-site, to pass TCLP-Lead. If the TCLP requirement can be met, the hard rubber battery casing material would be sent off-site for use as secondary fuel feed and the plastic would be recycled, if facilities can be identified that will accept these materials. If the TCLP requirement cannot be met, the material would be mixed with the hazardous soil, stabilized, and transported to a special waste landfill for disposal. Any remaining material that can not be recycled would be stabilized on-site and disposed of either on-site or off-site in an appropriate landfill. Only a small portion of the material not recycled would be allowed to be disposed of in an on-site landfill.

All of the excavated areas will be restored in accordance with usage.

Protection of Human Health and the Environment: With respect to the Taracorp pile, Alternative M-D is considered to be protective of human health and the environment by removing the contaminated material from the site. Small portions of non-recycled material disposed of on-site is considered to be protective of human health and the environment by stabilizing and containing the material in a landfill.

For other sections of the industrial area, Alternative M-D is considered to be protective of human health and the environment. By removing the contaminated material and restoring these areas with clean soil, exposure potential should be controlled.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- If on-site disposal is implemented, the design of the solid waste landfill should be equipped with a liner system consisting of a leachate drainage and collection system and a compacted earth or geocomposite liner and a final cover system (35 IAC Part 811, Subpart C: Putrescible and Chemical Waste Landfill)

- During excavation activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

- For transportation of wastes off-site, manifests will be required (35 IAC Part 722: Standards Applicable to Generators of Hazardous Waste; 35 IAC Part 723: Standards Applicable to Transporters of Hazardous Waste; 35 IAC Part 808: Special Waste Classifications; 35 IAC Part 809: Special Waste Hauling)

- For air, the ambient air quality standard for lead is 1.5 ug/m^3 (quarterly average) (35 IAC Part 243: Air Quality Standards)

- For waste characterized as hazardous, the treatment technique should stabilize the material to a level below the toxicity characteristics (TCLP-Lead $<$ 5 mg/L) (35 IAC Part 721 Identification and Listing of Hazardous Waste)

- If treatment is conducted in tanks, the tank systems are applicable to RCRA treatment and storage regulations (35 IAC Part 724, Subpart J - Standards for Treatment, Storage, and Disposal Facilities - Tank Systems)

- For on-site procedures such as washing and decontamination, local POTW discharge limits would apply (35 IAC Part 310: Pretreatment Programs; Granite City Sewer Use Ordinance No. 3819)

Other regulatory requirements that may be judged relevant and appropriate are listed in **Table 1-6** .

The restoration of excavated areas could be completed to meet the requirements of the ARARs. Air monitoring and dust control would be required.

Long Term Effectiveness: The long term effectiveness of Alternative M-D would be high. A majority or all of the contaminated material would be removed from the site, eliminating any long term risk.

Reduction of Toxicity, Mobility, or Volume: Contaminant mobility, toxicity, and volume would be controlled at the remainder of the main industrial site by removing the contamination from the site. Toxicity and volume would be reduced by recycling majority of the wastes.

Short Term Effectiveness: Alternative M-D requires extensive excavation of contaminated materials from the main industrial site. It would also require excavation of the Taracorp waste pile. This would create potential short term risks to human health and the environment by the potential for generation of contaminated dust and possible recontamination of nearby residential yards that had been remediated. Air monitoring and dust control would be required during all excavation, transportation, sorting, treatment, and restoration operations.

Implementability: Alternative M-D can be implemented using standard construction techniques, hazardous waste stabilization techniques, and successfully tested sorting and recycling techniques. Heavy equipment would be required for excavation and restoration on the industrial site, and to remove the SLLR and Taracorp piles. On-site sorting and treatment facilities would be utilized, if necessary, to separate and process the excavated material characterized as hazardous.

Monitoring restrictions required by Alternative M-D are readily implementable. Additional access restrictions or institutional controls would be required is a portion of the non-recycled material is disposed of on-site.

Costs: Total capital costs for Alternative M-D are estimated to be $87,400,000. Cost for M-D may be considerably lower if waste piles can be processed at a secondary lead smelter. No annual operating costs are expected after the alternative is implemented. Total present worth for 30 years of operation assuming 5% interest is estimated to be $87,400,000. A detailed cost estimate for Alternative M-D is shown in Table 3-8. It is estimated that the time required to implement Alternative M-D will range from 11 to 17 months.

4.2.2 Soil Media - Remote Fill Areas

4.2.2.1 Alternative RF-A: Removal of Remote Fill from Residential Areas; Treatment of Remote Fill Characterized as Hazardous; Capping of Remote Fill in Alleys and Driveways

The implementation of Alternative RF-A would involve excavation and/or capping, on-site or off-site disposal, treatment, and restoration technologies, as well as institutional and monitoring activities. Contaminated material contained in the residential remote fill areas would be excavated. Material characterized as hazardous would be stabilized either on-site or off-site. This material could then be disposed of into either an on-site or off-site landfill. Non-hazardous waste material would be transported directly to the landfill for disposal. The excavated areas will be restored in accordance with usage. Alleys and driveways containing remote fill material would be covered with an asphalt cap.

Protection of Human Health and the Environment: With respect to the remote fill areas, Alternative RF-A is considered to be protective of human health and the environment. Excavation, stabilization, and capping of the contaminated material limits contaminant migration via surface water, groundwater, and air pathways. It also limits the potential for direct contact with contaminants. Long term maintenance of the capped areas will be required, including periodic inspections.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- For transportation of wastes off-site, manifests will be required (35 IAC Part 722: Standards Applicable to Generators of Hazardous Waste; 35 IAC Part 723: Standards Applicable to Transporters of Hazardous Waste; 35 IAC Part 808: Special Waste Classifications; 35 IAC Part 809: Special Waste Hauling)

- For air, the ambient air quality standard for lead is 1.5 ug/m^3 (quarterly average) (35 IAC Part 243: Air Quality Standards)

- During construction, treatment, or capping activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

- For waste characterized as hazardous, the treatment technique should stabilize the material to a level below the toxicity characteristics (TCLP-Lead < 5 mg/L) (35 IAC Part 721 Identification and Listing of Hazardous Waste).

- If treatment is conducted in tanks, the tank systems are applicable to RCRA treatment and storage regulations (35 IAC Part 724, Subpart J - Standards for Treatment, Storage, and Disposal Facilities - Tank Systems).

- For on-site procedures using large amounts of water, such as washing and decontamination, local POTW discharge limits would apply (35 IAC Part 310: Pretreatment Programs; Granite City Sewer Use Ordinance No. 3819)

Other regulatory requirements that may be judged as relevant and appropriate are listed in **Table 1-6**.

Contaminated material from the remote fill areas could be excavated and transported or capped in accordance with these ARARs. Air monitoring and dust control would be required during construction.

Long Term Effectiveness: The long term effectiveness of Alternative RF-A on the residential remote fill areas is considered to be high due to the removal of the contaminant source and reduction in leaching potential. Placing a cap on the alleys and driveways would also prevent the release of airborne contaminants, and would greatly reduce the potential for direct contact with waste materials. Management of the capped areas for an indefinite time period would be required to insure its integrity.

Reduction of Toxicity, Mobility, or Volume: Contaminant mobility and toxicity would be eliminated for the residential areas containing remote fill material by removing the contamination from the site. However, the volume of material requiring disposal would be increased due to the stabilization process. The installation of a cap over the alleys and driveways containing remote fill would reduce the mobility of the contamination by eliminating run-on and direct contact of precipitation with waste materials, communication with groundwater, immobilization of the contamination, and preventing the release of airborne contaminants.

Short Term Effectiveness: Alternative RF-A requires excavation of contaminated materials from the residential areas containing remote fill. This would create potential short term risk to human health and the environment by the potential for generation of contaminated dust. The preparation of the subgrade material for the asphalt capping in the alleys would create potential short-term risk by the potential for generation of contaminated dust. Air monitoring and dust control would be required during all excavation, transportation, grading and capping operations.

Implementability: Alternative RF-A can be implemented using standard construction, and hazardous waste stabilization techniques. A combination of heavy equipment, light equipment, hand tools and manual labor would be required to excavate and restore the remote fill areas. An on-site or off-site treatment facility would be required to stabilize the excavated material characterized as hazardous. The cap over the alleys and driveways could also be installed using standard construction techniques.

Monitoring and access restrictions required by Alternative RF-A are readily implementable. The asphalt caps could be inspected with little difficulty. Surface soil could be periodically sampled to monitor for possible effects of erosion and frost upheaval. The deed restrictions and restrictive covenants required are also implementable, but would require legal and government review before being enacted.

Costs: Total capital costs for Alternative RF-A are estimated to range from $999,000 to $1,110,000 depending on the treatment and disposal method. Total annual operating costs are estimated to be $17,200 (no adjustment for inflation). Total present worth for 30 years of operation assuming 5% interest is estimated to range from $1,260,000 to $1,370,000. Detailed cost estimates with the varying treatment and disposal methods for Alternative RF-A presented in **Tables 3-9, 3-10 and 3-11**. It is estimated that the time required to implement Alternative RF-A will range from 6 to 8 months.

4.2.2.2 Alternative RF-B: Removal of Remote Fill from Remote Fill Areas to On-Site or Off-Site Landfill; Either On-Site or Off-Site Treatment of Remote Fill Characterized as Hazardous

Alternative RF-B uses the excavation, treatment, and disposal procedures that are incorporated into some or all of the alternatives. These procedures use proven techniques and standard construction equipment, and should be relatively easy to implement in a relatively short time frame.

Protection of Human Health and the Environment: With respect to the remote fill areas, Alternative RF-B is considered to be protective of human health and the environment. Excavation and stabilization of the contaminated material limits contaminant migration via surface water, groundwater, and air pathways. It also limits the potential for direct contact with contaminants.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- For transportation of wastes off-site, manifests will be required (35 IAC Part 722: Standards Applicable to Generators of Hazardous Waste; 35 IAC Part 723: Standards Applicable to Transporters of Hazardous Waste; 35 IAC Part 808: Special Waste Classifications; 35 IAC Part 809: Special Waste Hauling)

- For air, the ambient air quality standard for lead is 1.5 ug/m^3 (quarterly average) (35 IAC Part 243: Air Quality Standards)

- During excavation or on-site treatment activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

- For waste characterized as hazardous, the treatment technique should stabilize the material to a level below the toxicity characteristics (TCLP-Lead < 5 mg/L) (35 IAC Part 721 Identification and Listing of Hazardous Waste).

- If treatment is conducted in tanks, the tank systems are applicable to RCRA treatment and storage regulations (35 IAC Part 724, Subpart J - Standards for Treatment, Storage, and Disposal Facilities - Tank Systems).

- For on-site procedures using large amounts of water, such as washing and decontamination, local POTW discharge limits would apply (35 IAC Part 310: Pretreatment Programs; Granite City Sewer Use Ordinance No. 3819)

Other regulatory requirements that may be judged as relevant and appropriate are listed in **Table 1-6**.

Contaminated material from remote fill areas could be excavated and transported in accordance with these ARARs. Air monitoring and dust control would be required during construction.

Long Term Effectiveness: The long term effectiveness of Alternative RF-B on the remote fill areas is considered to be high due to the removal of the contaminant source and reduction in leaching potential.

Reduction of Toxicity, Mobility, or Volume: The removal of the remote fill material from the remote fill locations would eliminate the mobility of the contamination by eliminating run-on and direct contact of precipitation with waste materials, communication with groundwater and preventing the release of airborne contaminants. This alternative would significantly reduce the toxicity of the waste materials, but, due to the required stabilization of hazardous material, would increase rather than reduce the volume.

Short Term Effectiveness: Alternative RF-B requires extensive excavation of contaminated materials from the remote fill areas. This would create potential short term risk to human health and the environment by the potential for generation of contaminated dust. Air monitoring and dust control would be required during all excavation, transportation, and grading operations.

Implementability: Alternative RF-B can be implemented using standard construction and hazardous waste stabilization techniques. A combination of heavy equipment, light equipment, hand tools and manual labor would be required to excavate and restore the remote fill areas. An on-site or off-site treatment facility would be required to stabilize the excavated material characterized as hazardous.

Monitoring and access restrictions required by Alternative RF-B would be minimal due to the removal of the contaminated material.

Costs: Total capital costs for Alternative RF-B are estimated to range from $2,020,000 to $2,610,000 depending on the treatment and disposal method. No annual operating costs are expected after the alternative is implemented. Total present worth for 30 years of operation assuming 5% interest is estimated to range from $2,020,000 to $2,610,000. Detailed cost estimate for Alternative RF-B describing the various treatment and disposal methods are presented in **Tables 3-12, 3-13, and 3-14**. It is estimated that the time required to implement Alternative RF-B will range from 9 to 12 months.

4.2.3 Groundwater Media

4.2.3.1 Alternative G-A: Monitoring and Natural Attenuation

The Monitoring and Natural Attenuation Alternative includes a group of activities that would be used to monitor contaminant migration and a variety of institutional controls to limit access and land usage in the affected areas.

Protection of Human Health and the Environment: The monitoring and natural attenuation alternative addresses the potential receptor pathways that have been identified in a limited manner. By tracking the extent of contamination and the degree of natural attenuation, this alternative is at least partly protective of human health and the environment.

Compliance with ARARs: For groundwater, the Illinois Groundwater Quality Standard (IGQS) for lead is 0.0075 mg/l. Other IGQS standards applicable to the groundwater are listed in **Table 1-4** (35 IAC Part 620, Groundwater Quality). Alternative G-A would not comply with the ARARs that have been identified for groundwater.

Long Term Effectiveness: The long term effectiveness of Alternative G-A is minimal. The contaminated groundwater present under the industrial and remote fill areas would be left in place. The required institutional controls would limit direct contact by prohibiting the use of groundwater.

Reduction of Toxicity, Mobility, or Volume: Alternative G-A, by definition, does not reduce the toxicity, mobility, or volume of contaminants.

Short Term Effectiveness: Since the contaminants would be left in place during and after implementation of Alternative G-A, the short term impact to the community, workers, and the environment would be basically unchanged from present conditions. The institutional controls would provide limited improvements. The additional institutional controls required by this alternative could probably be implemented in less than one year.

Implementability: Monitoring and access restrictions required by Alternative G-A can be easily implemented. Installation of monitoring wells in the remote fill areas will be necessary to monitor natural attenuation. Deed restrictions and restrictive covenants would be implemented after the appropriate legal actions were taken. Implementation of Alternative G-A would not hinder the undertaking of additional remedial actions, if additional actions are required.

Cost: Alternative G-A is the least costly alternative to implement. Total capital costs are estimated to be $53,600. Total annual operating costs are estimated to be $57,800, with no adjustment for inflation. Total present worth for 30 years operation assuming 5% interest is estimated to be $940,000. A detailed cost estimate for Alternative G-A is shown in **Table 3-15**. It is estimated that the time required to implement Alternative G-A is one month.

4.2.3.2 Alternative G-B: Groundwater Containment on the Main industrial Site by Pumping and Disposal into the Local POTW; Monitoring and Natural Attenuation in the Remote Fill Areas

The implementation of Alternative G-B would involve groundwater action which would include monitoring, usage restrictions, installation of monitoring wells in remote fill areas, and the installation of a series of extraction wells on the main industrial site to develop a cone of depression so that no off-site groundwater flow is occurring.

Protection of Human Health and the Environment: For groundwater under the industrial area, Alternative G-B is considered to be protective of human health and the environment. Off-site flow of contaminated groundwater would be controlled.

For the remote fill areas, the monitoring and natural attenuation alternative addresses the potential receptor pathways that have been identified in a limited manner. By tracking the contamination and the degree of natural attenuation, this alternative is at least partly protective of human health and the environment.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- For groundwater, the Illinois Groundwater Quality Standard (IGQS) for lead is 0.0075 mg/l. Other IGQS standards applicable to the groundwater are listed in **Table 1-4** (35 IAC Part 620, Groundwater Quality).

- For disposal of groundwater and decontamination water to the local POTW, discharge limits would apply (35 IAC Part 310: Pretreatment Programs: Granite City Sewer Use Ordinance No. 3819)

- For off-site transportation of wastes generated from the remedial action, manifests will be required (35 IAC Part 722: Standards Applicable to Generators of Hazardous Waste; 35 IAC Part 723: Standards Applicable to Transporters of Hazardous Waste; 35 IAC Part 808: Special Waste Classifications; 35 IAC Part 809: Special Waste Hauling)

- During excavation activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10 hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

The remedial action required by Alternative G-B would comply with all ARARs.

Other regulatory requirements that may be judged relevant and appropriate are listed in **Table 1-6**.

Long Term Effectiveness: The long term effectiveness of Alternative G-B would be high for the main industrial site. Contaminated groundwater would be contained on the main industrial site, controlling long term risk. Long term effectiveness for the remote fill areas would depend on the rate of natural attenuation. The groundwater remedial action prescribed would still require long term groundwater monitoring.

Reduction of Toxicity, Mobility, or Volume: The mobility of the groundwater contamination would be eliminated by being contained on the main industrial site, with the long term groundwater withdrawal accelerating the natural attenuation process. However, the toxicity and volume of the contamination would be effectively unchanged. There would be no change at the remote fill areas.

Short Term Effectiveness: Alternative G-B requires groundwater withdrawals that would create a slight risk of an accidental release of contaminated groundwater.

Implementability: A drill rig would be required to install the required extraction wells and additional monitoring wells. The local POTW would process the groundwater produced by the extraction wells. If the produced groundwater cannot meet the requirements for POTW acceptance, then on-site pre-treatment will be required.

Additional remedial actions would not be anticipated for the remote fill areas. Monitoring and access restrictions required by Alternative G-B are readily implementable.

Costs: Total capital costs for Alternative G-B are estimated to be $466,000. Total annual operating costs are estimated to be $225,000 in year one, $200,000 in year two, and $165,000 in years three through thirty (no adjustment for inflation). Total present worth for 30 years of operation assuming 5% interest is estimated to be $2,990,000. A detailed cost estimate for Alternative G-B is shown in **Table 3-16**. It is estimated that the time required to implement Alternative G-B will range from two to four months.

4.2.3.3 Alternative G-C: Groundwater Containment on the Main Industrial Site Through a Combination of Installation of a Slurry Wall and Pumping and Disposal into the Local POTW; Monitoring and Natural Attenuation in the Remote Fill Areas

To contain groundwater contamination on the main industrial site, a slurry wall would be installed around the perimeter of the main industrial property to prevent off-site migration of groundwater contamination. One or more on-site extraction wells would be installed to develop a cone of depression within the slurry wall to maintain an inward gradient and to prevent off-site groundwater flow. The water produced from the extraction wells would be treated on-site, if necessary, and would be disposed of into the local POTW to be treated as a part of the daily waste stream.

Groundwater action for the remote fill areas would consist of long term monitoring, usage restriction, and natural attenuation. Additional monitoring wells would be required for the remote fill areas where there are no monitoring wells at the present time.

Protection of Human Health and the Environment: For groundwater under the industrial area, Alternative G-C is considered to be protective of human health and the environment. Off-site flow of contaminated groundwater would be controlled.

For the remote fill areas, monitoring and natural attenuation addresses the potential receptor pathways that have been identified in a limited manner. By monitoring the extent of contamination and the degree of natural attenuation, this alternative is at least partly protective of human health and the environment.

Compliance with ARARs: ARARs that would be applicable are specified as the following:

- For groundwater, the Illinois Groundwater Quality Standard (IGQS) for lead is 0.0075 mg/l. Other IGQS standards applicable to the groundwater are listed in **Table 1-4** (35 IAC Part 620, Groundwater Quality)

- For disposal of groundwater and decontamination water to local POTW, discharge limits would apply (35 IAC Part 310: Pretreatment Programs: Granite City Sewer Use Ordinance No. 3819)

- For off-site transportation of wastes generated from the remedial action, manifests will be required (35 IAC Part 722: Standards Applicable to Generators of Hazardous Waste; 35 IAC Part 723: Standards Applicable to Transporters of Hazardous Waste; 35 IAC Part 808: Special Waste Classifications; 35 IAC Part 809: Special Waste Hauling)

- During excavation activities, the Permissible Exposure Limit for lead is 50 ug/m^3 (10-hour time weighted average) (OSHA, 29 CFR 1910; 29 CFR 1926.62)

The remedial action required by Alternative G-B would comply with all ARARs.

Other regulatory requirements that may be judged relevant and appropriate are listed in **Table 1-6**.

Long Term Effectiveness: The long term effectiveness of Alternative G-C would be high for the main industrial site. The contaminated groundwater would be contained, controlling any long term risk. Long term effectiveness for the remote fill areas would depend on natural attenuation. Long term groundwater monitoring would be required.

Reduction of Toxicity, Mobility, or Volume: Contaminant mobility would be controlled at the main industrial site. However contaminant toxicity and volume would be unchanged. The long term groundwater withdrawal would accelerate the natural attenuation process. In the remote fill areas, contaminant mobility, toxicity, and volume would be unchanged.

Short Term Effectiveness: Under Alternative G-C, groundwater withdrawals would create a slight risk of an accidental release of contaminated groundwater at the main industrial site.

Implementability: Alternative G-C can be implemented using standard drilling, groundwater extraction and treatment techniques. The local POTW would process the groundwater produced by the extraction wells. If the produced groundwater cannot meet the requirements for POTW acceptance, then on-site pre-treatment will be required.

Additional remedial actions would not be anticipated for the remote fill areas. Monitoring required by Alternative G-C is readily implementable.

Costs: Total capital costs for Alternative G-C are estimated to be $16,600,000. Total annual operating costs are estimated to be $97,800 (no adjustment for inflation). Total present worth for 30 years of operation assuming 5% interest is estimated to be $18,100,000. A detailed cost estimate for Alternative G-C is shown in **Table 3-17**. It is estimated that the time required to implement Alternative G-C will range from six to eight months.

4.3 COMPARATIVE ANALYSIS

In this section, the alternatives will be compared according to the seven evaluation criteria that were used in Section 4.2. In comparing the alternatives, each of the evaluation criteria will be compared for the two areas of contamination: the main industrial area and the remote fill areas. The groundwater media alternatives will be compared separately. Summary matrices of the alternative comparisons are shown in **Tables 4-1, 4-2,** and **4-3.**

4.3.1 Overall Protection of Human Health and the Environment

While each of the ten alternatives was found to be at least partially protective of human health and the environment, the level of protection provided varies markedly.

Main Industrial Area: Alternatives M-A and M-B would eliminate the potential for direct contact and for airborne transport of contamination by installing a multimedia cap over the existing pile, as well as a bottom liner under the new section. Alternative M-B also would stabilize the hazardous waste and install a liner under the stabilized pile. These actions would greatly reduce infiltration of precipitation and the associated leaching of contaminants from the pile. Alternatives M-C1, M-C2, and M-D would eliminate the potential for direct contact, airborne transport, and contaminant migration by removing the contaminated soils and waste piles from the site. The removal of the waste piles would also eliminate the major source contributing to groundwater contamination.

Remote Fill Areas: Alternative RF-A would eliminate exposure and migration risk on residential remote fill sites by removal, and reduce the risk of direct contact and contaminant migration in alleys and driveways by capping with asphalt. Alternative RF-B would eliminate exposure and migration risks by removing the contaminated material from all known remote fill areas.

Groundwater: Alternative G-A would handle groundwater contamination in the main industrial area and the remote fill areas by natural attenuation. Alternatives G-B and G-C would install groundwater extraction wells to develop a cone of depression so that no off-site groundwater flow is occurring. Alternative G-C would add a perimeter slurry wall around the main industrial site to further reduce the risk of off-site flow.

4.3.2 Compliance with ARARs

The alternatives discussed would address the ARARs that have been identified to varying degrees.

Main Industrial Area: Alternative M-A would address the ARARs for solid media, but would not reduce the level or amount of contamination present. Alternative M-A would rely instead on containment to control exposure to soil contamination. Alternatives M-A and M-B would address the ARARs for solid media by consolidating and capping the contaminated material on the main industrial site. In addition, Alternative M-B would address ARARs for solid media by stabilizing the hazardous material prior to placing it in an on-site lined landfill. Alternatives M-C1, M-C2, and M-D would address ARARs for solid media by removing the source of the contamination to an off-site disposal and/or recycling facility.

Remote Fill Areas: Alternative RF-A would address the ARARs for solid media, but would leave the contamination in place in alleys and driveways. It would rely on containment to control soil contamination in these areas.

Alternative RF-B would remove the contaminated fill from alleys and driveways.

Groundwater: Alternative G-A would rely on natural attenuation to alleviate groundwater contamination which currently is not in compliance with the Illinois groundwater standards. Alternatives G-B and G-C would address the ARARs for the groundwater media.

Alternatives G-B and G-C would control off-site groundwater flow by actively pumping contaminated groundwater for treatment at the local POTW.

4.3.3 Long-Term Effectiveness

Main Industrial Area: The long term effectiveness of the alternatives presented varies markedly for the main industrial areas. Alternative M-A would be dependent on continuing long term maintenance and repair, but would provide long term effectiveness for direct contact, but not leaching and migration of contamination to groundwater. Capping would reduce the potential for leaching. Alternative M-B would depend on the long term effectiveness of the stabilization process utilized on the hazardous material contained in the landfill. However, the stabilization of the waste material would minimize the contaminants in the leachate, and the landfill's leachate collection system would minimize the quantity of leachate that could possibly migrate to groundwater. Alternatives M-C1, M-C2, and M-D would provide excellent long term effectiveness by removing the contamination at the site. Alternative M-D would offer additional long term benefits to potential off-site disposal locations by minimizing the volume of material requiring disposal.

Remote Fill Areas: Alternative RF-A would be dependent on continuing long term maintenance and repair of the capped alleys and driveways, but would provide long term effectiveness by limiting direct contact and minimizing leaching and migration of contamination to groundwater. Alternative RF-B would provide excellent long term effectiveness by removing the contaminant source from these areas.

Groundwater: Alternative G-A would eventually be effective as a long term remedy, but is dependent on the rate at which the natural attenuation process would occur. Alternatives G-B and G-C would contain existing and potential groundwater contamination on the main industrial site as long as the extraction wells remained active, but would not address groundwater contamination in the remote fill areas. An extended groundwater monitoring program would be required after groundwater extraction has been discontinued to verify that the contaminant reduction is permanent, and to monitor natural attenuation in the remote fill areas.

4.3.4 Reduction of Toxicity, Mobility, and Volume

Main Industrial Area: For Alternative M-A, the cap and partial liner would significantly reduce the mobility of contaminants, but would not address toxicity or volume. For Alternative M-B, the stabilization of the waste material, in conjunction with the cap and liner, would greatly reduce toxicity and mobility of contaminants, but would significantly increase the volume of the pile. Alternatives M-C1 and M-C2, would control both the toxicity and mobility on-site by stabilizing the hazardous material and disposing of it off-site. There would be, however, an increase in the volume of material to be disposed of. Removal of the contaminated material would also prevent the mobility of the contaminants to groundwater. Alternative M-D would also control contaminant toxicity and mobility on-site, and would have the added advantage of reducing the off-site disposal volume through recycling.

Remote Fill Areas : Alternative RF-A would eliminate contaminants from residential remote fill areas and limit contaminant mobility in alleys and driveways by installing an appropriate capping layer over these areas. Alternative RF-B would eliminate contaminant toxicity and mobility at all remote fill areas by removal of the contaminated material.

Groundwater: Alternative G-A would not have any impact on the toxicity, mobility, and volume of the contaminants. Alternatives G-B and G-C would control the mobility of contaminated groundwater by containing it on the main industrial site, but would not have any impact on the remote fill areas.

4.3.5 Short-Term Effectiveness

Main Industrial Area: Alternative M-A would have minimal short term impact. However, there would be some potential for dust generation created by the large degree of regrading and reconfiguring the existing waste pile to meet the slope requirements. Alternatives M-B, M-C2, M-C1, and M-D would significantly increase the risk for dust generation due to the extensive excavation and transport of contaminated material required. Alternative M-B and

M-C2 would also involve stabilization of hazardous material on-site, which could possible generate additional exposure risk to contaminated dust.

Remote Fill: Alternatives RF-A and RF-B would significantly increase the risk for dust generation due to the extensive excavation and transport of contaminated material required. These alternatives may also involve stabilization of hazardous material, which could possible generate additional exposure risk to contaminated dust. These alternatives would also have the additional short term risk components of off-site transport of contaminated material.

Groundwater: Alternative G-A would have negligible short term impact. Alternatives G-B and G-C would have the additional potential for an accidental release of contaminated groundwater.

4.3.6 Implementability

Main Industrial Area: Alternative M-A would use proven construction procedures and would be easy to implement in a short time frame. Long term access controls would still be required. Alternative M-B uses proven technology but is logistically more difficult to implement due to the excavation and stabilization of the contaminated wastes, and the staging of this material while the on-site landfill cell is being constructed. For Alternatives M-A and M-B, access to and use of the Trust 454, BV&G, and Rich Oil properties would be required for successful implementation. Alternative M-C2 uses proven technology to stabilize the contaminated wastes. Alternatives M-C1 and M-D would treat the material off-site, minimizing the need for construction of on-site facilities. Alternative M-D would be the most logistically difficult to implement due to the required sorting, segregation, and variety of treatment technologies required. Additionally, there are the logistical problems associated with permitting and transporting contaminated material to a variety of recycling and disposal sites.

Remote Fill Areas : Alternative RF-A uses proven construction techniques and would take less time to implement than to Alternative RF-B due to capping of the alleys with paving materials. Alternative RF-B uses proven construction techniques, but would take considerable time to implement due to extensive excavation, transportation, and permitting. It would, however, eliminate the need for long term access controls in these areas.

Groundwater: Alternative G-A is readily implementable. Alternative G-B and G-C use proven construction techniques. However, implementation of Alternative G-C would be more involved due to the installation of the slurry wall.

4.3.7 Cost Estimates and Analysis

The cost of each remedial alternative has been estimated using published information available in the RI/FS (O'Brien & Gere, 1988/1989), the PDFI Final Report (W-C, 1993), and general construction cost estimating manuals (R.S.Means, 1993). Information was also obtained from discussions with potential remediation contractors. The cost estimates presented in this Addendum are based on available information and engineering judgement, and should be considered sufficiently accurate to use as a basis of comparison between alternatives.

Feasibility cost estimates are intended to provide an accuracy range of +50 to -30 percent of actual cost. The final project cost will depend on actual labor and material cost, productivity, competitive market conditions, final project scope, schedule, and other variable factors. A more detailed cost analysis of the selected remedy will be necessary prior to the start of any major remedial activity.

Feasibility cost estimates include total capital costs, operating and maintenance costs, and the total present worth cost of each alternative.

4.3.7.1 Total Capital Costs

Capital costs include direct and indirect costs required to implement and install a remedial action. Direct costs include labor, material, and equipment necessary for construction or implementation of the remedial action. Indirect costs include engineering, administration, licensing, permitting, and services during construction. Indirect capital costs include bid and scope contingencies, which are estimated as percentages of the total direct cost to account for unknown costs. Bid contingencies account for such items as the economic conditions at the time of bidding, weather conditions, material supply conditions, and geotechnical unknowns. Scope contingencies account for changes and refinements to the scope of work that occur during final design and changes that can occur during construction. Scope contingencies also include provisions for the inherent uncertainties in characterizing waste volumes and possible changes in regulations and/or policies.

Also included in the total capital costs are the costs incurred by the USACE rapid response program, which to date total $9,000,000.

4.3.7.2 Operation and Maintenance Costs

Operation and Maintenance (O&M) costs are costs necessary to ensure the continued effectiveness of the remedial action. O&M costs are estimated on an annual basis, and include costs for labor, maintenance materials, operating services, inspections, site reviews, and administration.

4.3.7.3 Present Worth Cost

Present worth is the amount of money that would need to be secured in the base year to cover the future costs associated with a particular time period at a particular interest rate. Computation of present worth costs allows for the evaluation and comparison of future costs discounted to a base year. For FS purposes the current year is the base year. Except where noted, present worth cost is calculated for a 30 year period at a 5% discount rate in accordance with the methodology presented in the Remedial Action Costing Procedures Manual (USEPA, 1987). Also included in Table 4-4 for comparative purposes is a present worth analysis illustrating the effect of a lower discount rate (3 percent) and a higher discount rate (10 percent).

4.3.8 Discussion and Comparison of Costs

The cost of each of the alternatives is as follows:

Main Industrial Area - Solid Media

Alternatives	Capital Costs	Operation & Maintenance	Present Worth	Time to Implement
M-A	$4,510,000	$18,700	$4,800,000	9-15 months
M-B	$28,700,000	$20,100	$29,000,000	12-18 months
M-C1	$64,800,000	$0	$64,800,000	6-12 months
M-C2	$34,600,000	$0	$34,600,000	10-16 months
M-D*	$87,400,000	$0	$87,400,000	11-17 months

* Cost for M-D may be considerably lower if waste piles can be processed at a secondary lead smelter.

Remote Fill Areas - Solid Media

	Capital Costs	Operation & Maintenance	Present Worth	Time to Implement
Alternative RF-A				
(On-Site Treatment and Disposal)	$1,010,000	$17,200	$1,270,000	6-8 months
(On-Site Treatment, Off-Site Disposal)	$999,000	$17,200	$1,260,000	6-8 months
(Off-Site Treatment and Disposal)	$1,110,000	$17,200	$1,370,000	6-8 months

Remote Fill Areas - Solid Media

	Capital Costs	Operation & Maintenance	Present Worth	Time to Implement
Alternative RF-B				
(On-Site Treatment and Disposal)	$2,020,000	$0	$2,020,000	9-12 months
(On-Site Treatment, Off-Site Disposal)	$2,180,000	$0	$2,180,000	9-12 months
(Off-Site Treatment and Disposal)	$2,610,000	$0	$2,610,000	9-12 months
Groundwater Media				
G-A	$53,600	$57,800	$940,000	1 month
G-B	$466,000	$165,000(1)	$2,990,000	2-4 months
G-C	$16,600,000	$97,800	$18,100,00	6-8 months

(1) The annual costs for the first two years of Alternative G-B will be $225,000 and $200,000, respectively.

A comparative summary of total costs for these alternatives is presented in Table 4-5. Costs are shown for each media and area specific alternative. To determine a total remedial cost alternative for the entire NL site, one cost alternative must be selected from each column. For completeness, remedial costs for the adjacent residential area, the Taracorp drums, and the USACE rapid response program are also included in Table 4-5.

The range of costs for the remedial alternatives is significantly broader than the range presented in the 1989 FS. There are a number of reasons for this. The most significant is that the extent and scope of contamination requiring remediation is much greater than what was assumed in the original FS (Table 4-6). The 1989 FS assumed that approximately 21,000 cubic yards of material would require excavation, excluding the contents of the Taracorp and SLLR piles. By comparison, based on the PDFI and supplemental investigation, it is estimated that, excluding the piles, approximately 149,000 cubic yards of material will require excavation. This increase in the soil volumes to be excavated is the reason for the marked increase in the cost of the various remedial options. Additionally, the 1989 FS assumed groundwater remediation would not be necessary. In this second addendum, options are included for addressing groundwater contamination.

4.4 SUMMARY

A detailed comparison of the nine alternatives indicated that each one was at least partially protective of human health and the environment, and that all of the alternatives would comply with the ARARs that apply to soil and solid media. Alternatives G-B and G-C would fully comply with the ARARs for groundwater.

The long term effectiveness of Alternatives M-A, M-B, and RF-A would depend on continuing long term maintenance and monitoring. Capping will slow leaching, but will prolong natural attenuation in comparison with no action. Alternatives M-C1, M-C2, M-D, and RF-A would provide excellent long term effectiveness by removing the contaminant source for off-site disposal. Alternative RF-B would remove the contaminant source in the residential remote fill areas, but would only cap it in driveways and alleys.

Alternatives G-B and G-C would also contain groundwater contamination on the main industrial site as long as the groundwater extraction wells were active. A groundwater containment system such as those described in Alternatives G-B and G-C would be effective at preventing migration of contamination off of the main industrial property.

Alternatives M-B through M-D would effectively minimize the toxicity and mobility of the contamination through stabilization or removal. Only Alternative M-D would reduce the volume of contaminated material. Alternatives G-B and G-C would also reduce the mobility of contaminated groundwater by containing it on the main industrial site.

All of the alternatives except for Alternative G-A would have short term impacts on the site. The most significant impact is the possible generation of dust from excavation, transportation, treatment, and restoration activities.

In general, the more complex an alternative becomes, the more involved is the implementation of that alternative, and the longer it will take to fully implement. However. even the more involved alternatives can be implemented without insurmountable difficulties. Added attention will need to be paid to the logistics and administrative details for the more involved alternatives.

The same can be said with regard to cost: The more complex alternatives will tend to cost more. As is presented in Section 4.3.8, the estimated capital costs for the various remedial alternatives for the main industrial site range from $4,510,000 for Alternative M-A to $87,400,000 for Alternative M-D. Alternative RF-B offers a higher degree of effectiveness for the remote fill areas by removal of the contaminated material than Alternative RF-A which includes removal and capping. The estimated capital costs for Alternative RF-A and RF-B range from $999,000 to $1,110,000 and from $2,020,000 to $2,610,000, respectively. For groundwater, the same can be said for Alternatives G-B and G-C, which would also actively contain groundwater contamination on-site. Capital costs for groundwater remediation alternatives are estimated to be $53,600 for G-A, $466,000 for G-B, and $16,600,000 for G-C.

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TABLE 1-1

EAGLE PARK ACRES REMOTE FILL AREAS
NL/TARACORP SUPERFUND SITE

SAMPLED DURING PDFI	
108 CARVER	100 HILL
111 CARVER	128 ROOSEVELT
202A HARRISON	203/205 TERRY
203 HARRISON	200 TERRY
205 HARRISON	
SAMPLED DURING SUPPLEMENTAL INVESTIGATION	
200 ALLEN	212 HILL
203 ALLEN	202 TERRY
123 BOOKER	204 TERRY
104 CARVER	210 WATSON
126 CARVER	212 WATSON
212 CARVER	213 WATSON
101 HARRISON	214 WATSON
95 HILL	215 WATSON
206 HILL	217 WATSON
209 HILL	WATSON ALLEY
211 HILL	

TABLE 1-2

OTHER REMOTE FILL AREAS
NL/TARACORP SUPERFUND SITE

SAMPLED DURING PDFI	
2230 CLEVELAND	MISSOURI AVENUE (OLD RT. 3)
3108 COLGATE	SAND ROAD (FARMER'S FIELD)
1628 DELMAR	SCHAEFFER ROAD
FIVE (5) VENICE ALLEYS	
SAMPLED DURING SUPPLEMENTAL INVESTIGATION	
205 ABBOTT	276 COLLINSVILLE STREET
3213 COLGATE	GLEN CARBON ALLEY
FIFTY THREE (53) VENICE ALLEYS	

TABLE 1-3
PROPERTIES REMEDIATED UNDER THE USACE RAPID RESPONSE PROGRAM AT THE NL/TARACORP SUPERFUND SITE

Remote Fill Properties	
Eagle Park Acres	
• 123 Booker	• 209 Hill
• 101 Carver	• 211 Hill
• 104 Carver	• 203/205 Terry
• 108 Carver	• 207 Terry
• 125 Carver	• 208 Terry
• 210 Carver	• 210 Terry
• 212 Carver	• 210 Watson
• 202A Harrison	• 214 Watson
• 203/205 Harrison	• 319 Watson
• 100/201 Hill	
Venice Alleys	
• Alley 6	• Alley 49
• Alley 7-1/2	• Alley 53
• Alley 49	• Alley 59
• Alley 13	• Alley 60
• Alley 16	• Alley 62
• Alley 19	• Alley 62-1/2
• Alley 21	• Alley 63
• Alley 27	• Alley 64
• Alley 28	• Alley 65
• Alley 44	• Alley 65-1/2
• Alley 45	
Other Remote Fill Areas	
• 2226/2230 Cleveland	• Missouri Avenue
• 3108 Colgate	• 115 Weber Street
• 1628 Delmar	• Driveway next to Venice Alley No. 36
• 1712 Market Street	

TABLE 1-3
PROPERTIES REMEDIATED UNDER THE USACE RAPID RESPONSE PROGRAM AT THE NL/TARACORP SUPERFUND SITE
(Continued)

Adjacent Residential Properties	
• 1624 Cleveland	• 907 Grand Ave., Madison
• 1628 Cleveland	• 1410 Grand
• 1632 Cleveland	• 1440 Grand
• 1640 Cleveland	• 1442 Grand
• 1642 Cleveland	• 1443 Grand
• 1726 Cleveland	• 1444 Grand
• 1728 Cleveland	• 919 Iowa Avenue, Madison
• 1619 Delmar	• 1329 Madison, Madison
• 1624 Delmar	• 1423 Madison
• 1630 Delmar	• 1429 Madison
• 1633 Delmar	• 822 Niedringhouse
• 1636 Delmar	• 1342 State Street, Madison
• 1638 Delmar	• 1408 State
• 1641 Delmar	• 1638 State Street, Granite City
• 1627 Edison	• 1717 State Street, Granite City
• 1643 Edison	

TABLE 1-4
FEDERAL DRINKING WATER STANDARDS AND STATE GROUNDWATER STANDARDS NL/TARACORP SUPERFUND SITE

Target Analyte List	Unit	Federal MCLs[1] (mg/L)	Illinois Class I Standards[2] (mg/L)
Antimony	mg/l	0.006[3]	-
Arsenic	mg/l	0.05	0.05
Beryllium	mg/l	0.004[3]	-
Cadmium	mg/l	0.005	0.005
Chromium	mg/l	0.1	0.1
Copper	mg/l	1.3[4]	0.65
Lead	mg/l	0.015[4]	0.0075
Mercury	mg/l	0.002	0.002
Nickel	mg/l	0.1[3]	0.1
Selenium	mg/l	0.05	0.05
Silver	mg/l	-	0.05
Thallium	mg/l	0.002[3]	-
Zinc	mg/l	-	5.0

Notes:

[1]MCL - Maximum Contaminant Level. Maximum permissible level of a contaminant in water which is delivered to any user of a public water system. (40 CFR 141.62)

[2]Illinois Groundwater Quality Standard for Class I Potable Resource Groundwater. (35 IAC 620.410)

[3]MCL to become effective January 17, 1994. (40 CFR 141.62)

[4]Action Level that triggers treatment.

Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-101 JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	0.014 (1)	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–					<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	4.2 (3)	0.77 (3)	0.46 (3)	0.181 (3)	0.017	0.015	1.58(3)
Arsenic, filtered	mg/l	0.05	0.05					<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	0.0026	<0.0006	0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–					<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	0.0039	0.0053 (3)	<0.005	0.006 (3)	<0.005	<0.005	0.078(3)
Cadmium, filtered	mg/l	0.005	0.005					<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	0.034	0.018 U	0.077	0.047	<0.010	0.011	0.051
Chromium, filtered	mg/l	0.1	0.1					<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	0.06	0.017	0.039	0.063	0.072	0.058	0.048
Copper, filtered	mg/l	1.3*	0.65					<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.130 (3)	0.023 (3)	0.027 (3)	0.077 (3)	<0.003	0.008(2)	0.054(3)
Lead, filtered	mg/l	0.015*	0.0075					<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002					<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.1	0.1	0.13 (3)	0.027	0.077	0.072	<0.040	<0.040	0.154(3)
Nickel, filtered	mg/l	0.1	0.1					<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	0.007	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05					<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05					0.01	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	0.002	<0.002
Thallium, filtered	mg/l	0.002	–					<0.002	0.002	0.004 (1)
Zinc	mg/l	–	5.0	0.35	0.098	0.11	0.199	0.052	0.068	0.246
Zinc, filtered	mg/l	–	5.0					<0.020	<0.020	<0.020

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-102 SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–		<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	0.015	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05		<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–		<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005		<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	0.027	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1		<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	0.028	<0.025	0.036	<0.025
Copper, filtered	mg/l	1.3*	0.65		<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.136 (3)	<0.003	<0.003	0.038(3)
Lead, filtered	mg/l	0.015*	0.0075		<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002		<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.1	0.1	0.062	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1		<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	0.015	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05		<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05		<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–		<0.002	<0.002	<0.002
Zinc	mg/l	–	5.0	0.123	<0.020	0.031	0.028
Zinc, filtered	mg/l	–	5.0		<0.020	<0.020	<0.020

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-103-91					
				JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.002	0.014 (1)	<0.060	<0.050	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–						
Arsenic	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05						
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–						
Cadmium	mg/l	0.005	0.005	0.0017	<0.005	<0.005	<0.005	0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005						
Chromium	mg/l	0.1	0.1	<0.002	0.029 U	<0.013	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1						
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	<0.025
Copper, filtered	mg/l	1.3*	0.65						
Lead	mg/l	0.015*	0.0075	0.0027	0.0038	<0.002	<0.003	<0.003	<0.003
Lead, filtered	mg/l	0.015*	0.0075						
Mercury	mg/l	0.002	0.002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002						
Nickel	mg/l	0.1	0.1	<0.023	<0.023	<0.023	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1						
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05						
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	0.012	<0.010
Silver, filtered	mg/l	–	0.05						
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–						
Zinc	mg/l	–	5.0	0.036	0.074 J	<0.020	<0.020	<0.020	<0.020
Zinc, filtered	mg/l	–	5.0						

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW–104 JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	0.023 (1)	0.013 (1)	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–					<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	0.086 (3)	0.087 (3)	0.0046	0.018	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05					<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	0.0019	0.00322	<0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–					<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	0.0027	<0.005	<0.005	0.005 (3)	0.006 (3)	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005					<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	0.047	0.098 J	<0.013	0.035	<0.010	0.015	0.019
Chromium, filtered	mg/l	0.1	0.1					<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	0.064	0.097	<0.014	<0.025	<0.025	<0.025	<0.025
Copper, filtered	mg/l	1.3*	0.65					<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.47 (3)	0.42 (3)	0.013 (2)	0.043 (3)	0.019(3)	0.032(3)	0.091(3)
Lead, filtered	mg/l	0.015*	0.0075					<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	0.0003	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002					<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.1	0.1	0.12 (3)	0.19 (3)	<0.023	0.047	<0.040	<0.040	0.052
Nickel, filtered	mg/l	0.1	0.1					<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05					<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05					<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–					<0.002	<0.002	<0.002
Zinc	mg/l	–	5.0	0.24	0.38 J	<0.020	0.072	<0.020	0.040	0.050
Zinc, filtered	mg/l	–	5.0					<0.020	<0.020	<0.020

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-104-92 JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	0.007 (1)	0.01 (1)	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–					<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	0.0088	0.0032	<0.003	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05					<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–					<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	0.0033	<0.005	<0.005	0.005 (3)	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005					<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	0.002	0.034 J	<0.013	<0.010	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1					<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	<0.025	0.047
Copper, filtered	mg/l	1.3*	0.65					<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.44 (3)	0.27 (3)	0.043 (3)	0.520/0.480 (3)	0.036(3)	0.054(3)	0.090(3)
Lead, filtered	mg/l	0.015*	0.0075					<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002					<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.1	0.1	<0.023	<0.023	<0.023	<0.040	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1					<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05					<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05					<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–					<0.002	<0.002	<0.002
Zinc	mg/l	–	5.0	0.082	0.066 J	<0.020	0.037	<0.020	0.020	<0.020
Zinc, filtered	mg/l	–	5.0					<0.020	<0.020	<0.020

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW–105S				MW–106S		
				SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994	SEPTEMBER 1993	APRIL 1994	JULY 1994
Antimony	mg/l	0.006	–	<0.050	<0.006	<0.006	<0.006	<0.050	0.008 (1)	<0.006
Antimony, filtered	mg/l	0.006	–		<0.006	<0.006			<0.006	<0.006
Arsenic	mg/l	0.05	0.05	<0.010	<0.010	<0.010	0.029	0.014	0.081 (3)	0.043
Arsenic, filtered	mg/l	0.05	0.05		<0.010	<0.010			<0.010	<0.010
Beryllium	mg/l	0.004	–	<0.005	<0.004	<0.004	<0.004	<0.005	0.007 (1)	0.006(1)
Beryllium, filtered	mg/l	0.004	–		<0.004	<0.004			<0.004	<0.004
Cadmium	mg/l	0.005	0.005	<0.005	<0.005	<0.005	0.017(3)	<0.005	0.005	0.008(3)
Cadmium, filtered	mg/l	0.005	0.005		<0.005	<0.005			<0.005	<0.005
Chromium	mg/l	0.1	0.1	0.029	<0.010	0.026	0.118(3)	0.476 (3)	0.183 (3)	0.137(3)
Chromium, filtered	mg/l	0.1	0.1		<0.010	<0.010			<0.010	<0.010
Copper	mg/l	1.3*	0.65	<0.025	<0.025	<0.025	0.055	0.056	0.179	0.16
Copper, filtered	mg/l	1.3*	0.65		<0.025	<0.025			<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.015 (3)	0.008 (2)	0.035(3)	0.149(3)	0.143 (3)	0.776 (3)	0.269(3)
Lead, filtered	mg/l	0.015*	0.0075		<0.003	<0.003			<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006 (3)	0.0003
Mercury, filtered	mg/l	0.002	0.002		<0.0002	<0.0002			<0.0002	<0.0002
Nickel	mg/l	0.1	0.1	<0.040	<0.040	<0.040	0.122(3)	0.366 (3)	0.22 (3)	0.208(3)
Nickel, filtered	mg/l	0.1	0.1		<0.040	<0.040			<0.040	<0.040
Selenium	mg/l	0.05	0.05	0.016	0.011	<0.005	<0.005	0.011	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05		0.014	<0.005			<0.005	<0.005
Silver	mg/l	–	0.05	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05		<0.010	<0.010			<0.010	<0.010
Thallium	mg/l	0.002	–	<0.050	<0.002	<0.002	<0.002	<0.050	0.003 (1)	0.003 (1)
Thallium, filtered	mg/l	0.002	–		<0.002	<0.002			<0.002	<0.002
Zinc	mg/l	–	5.0	0.039	<0.020	0.045	0.360	0.181	0.876	0.671
Zinc, filtered	mg/l	–	5.0		<0.020	<0.020			<0.020	0.023

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW–106D JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	0.003	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–					<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	0.013	0.0032	<0.003	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05					<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–					<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005					<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	<0.002	0.015 U	<0.013	0.019	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1					<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	0.063	<0.025
Copper, filtered	mg/l	1.3*	0.65					<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.019 (3)	0.019 (3)	<0.002	<0.003	<0.003	0.012 (2)	<0.003
Lead, filtered	mg/l	0.015*	0.0075					<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002					<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.1	0.1	<0.023	0.026	<0.023	<0.040	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1					<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	0.0077	0.01	0.0098	0.013	0.005 J	0.008	0.006
Selenium, filtered	mg/l	0.05	0.05					0.006	0.008	0.006
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05					<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–					<0.002	<0.002	<0.002
Zinc	mg/l	–	5.0	<0.020	0.067	<0.020	<0.020	0.026	0.041	<0.020
Zinc, filtered	mg/l	–	5.0					<0.020	<0.020	<0.020

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-107S JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	0.008 (1)	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–					<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	0.044	0.10 (3)	0.026	<0.010	<0.010	0.032	0.093(3)
Arsenic, filtered	mg/l	0.05	0.05					<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	0.002	0.0079 (1)	0.0019	<0.005	<0.004	<0.004	0.006(1)
Beryllium, filtered	mg/l	0.004	–					<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	0.0032	0.010 (3)	<0.005	<0.005	<0.005	0.006(3)	0.029(3)
Cadmium, filtered	mg/l	0.005	0.005					<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	0.042	0.35 J (3)	0.061	0.014	0.017	0.270(3)	0.142(3)
Chromium, filtered	mg/l	0.1	0.1					<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	0.064	0.3	0.066	<0.025	<0.025	0.116	0.222
Copper, filtered	mg/l	1.3*	0.65					<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.14 (3)	0.52 (3)	0.087 (3)	0.047 (3)	0.007	0.077(3)	0.176(3)
Lead, filtered	mg/l	0.015*	0.0075					<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	0.0006	<0.0002	<0.0002	<0.0002	0.0018	0.0004
Mercury, filtered	mg/l	0.002	0.002					<0.0002	0.0015	<0.0002
Nickel	mg/l	0.1	0.1	0.11 (3)	0.43 (3)	0.092	<0.040	<0.040	0.257(3)	0.280(3)
Nickel, filtered	mg/l	0.1	0.1					<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	0.011	<0.005	<0.005	0.010
Selenium, filtered	mg/l	0.05	0.05					<0.005	0.006	<0.005
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05					<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–					<0.002	<0.002	0.003 (1)
Zinc	mg/l	–	5.0	0.25	0.86	0.18	0.084	0.041	0.282	0.59
Zinc, filtered	mg/l	–	5.0					<0.020	<0.020	<0.020

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-107D JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	0.005	<0.011	<0.060	<0.050	<0.006	<0.006 UJ	<0.006
Antimony, filtered	mg/l	0.006	–					<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	0.065 (3)	0.04	0.024	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05					<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	0.0016	0.0017	0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–					<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	0.0018	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005					<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	0.044	0.067 J	0.078	0.076	<0.010	0.118(3)	0.113(3)
Chromium, filtered	mg/l	0.1	0.1					<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	0.052	0.054	0.027	<0.025	<0.025	<0.025	0.100
Copper, filtered	mg/l	1.3*	0.65					<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.11 (3)	0.12 (3)	0.067 (3)	<0.003	<0.003	0.006	0.015(2)
Lead, filtered	mg/l	0.015*	0.0075					<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	0.0010 J	<0.0002
Mercury, filtered	mg/l	0.002	0.002					<0.0002	0.0006	<0.0002
Nickel	mg/l	0.1	0.1	0.054	0.057	0.045	<0.040	<0.040	0.092	0.086
Nickel, filtered	mg/l	0.1	0.1					<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005 UJ	<0.005
Selenium, filtered	mg/l	0.05	0.05					<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010UJ
Silver, filtered	mg/l	–	0.05					<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–					<0.002	<0.002	<0.002
Zinc	mg/l	–	5.0	0.22	0.25	0.091	0.05	<0.020	0.042	0.054
Zinc, filtered	mg/l	–	5.0					<0.020	<0.020	<0.020

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-107D QC FIELD DUPLICATE APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–	<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05	<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–	<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	<0.005	<0.005	0.006(3)
Cadmium, filtered	mg/l	0.005	0.005	<0.005	<0.005	<0.005
Chromium	mg/l	0.1	0.1	<0.010	0.158(3)	0.062
Chromium, filtered	mg/l	0.1	0.1	<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	<0.025	<0.025	0.253
Copper, filtered	mg/l	1.3*	0.65	<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	<0.003	0.006	0.093(3)
Lead, filtered	mg/l	0.015*	0.0075	<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	0.0012	<0.0002
Mercury, filtered	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.1	0.1	<0.040	0.116(3)	0.067
Nickel, filtered	mg/l	0.1	0.1	<0.040	<0.040	<0.040
Selenium	mg/l	0.05	0.05	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05	<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05	<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–	<0.002	<0.002	<0.002
Zinc	mg/l	–	5.0	<0.020	0.032	0.189
Zinc, filtered	mg/l	–	5.0	<0.020	<0.020	<0.020

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW–108S SEPTEMBER 1993	MW–108S APRIL 1994	MW–108S JULY 1994	MW–108S OCTOBER 1994
Antimony	mg/l	0.006	–	<0.050	0.007 (1)	<0.006	0.010(1)
Antimony, filtered	mg/l	0.006	–		<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	0.109 (3)	0.017	0.025	0.091(3)
Arsenic, filtered	mg/l	0.05	0.05		<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–		<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	0.475 (3)	0.180 (3)	0.225(3)	0.963(3)
Cadmium, filtered	mg/l	0.005	0.005		0.144 (3)	0.123(3)	0.368(3)
Chromium	mg/l	0.1	0.1	0.082	0.043	1.35(3)	0.318(3)
Chromium, filtered	mg/l	0.1	0.1		<0.010	<0.010	<0.010
Copper	mg/l	1.3*	0.65	0.092	0.039	0.140	0.108
Copper, filtered	mg/l	1.3*	0.65		<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	1.02 (3)	0.312 (3)	0.246(3)	1.17(3)
Lead, filtered	mg/l	0.015*	0.0075		<0.003	<0.003	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	0.0015	0.0003
Mercury, filtered	mg/l	0.002	0.002		<0.0002	0.0005	<0.0002
Nickel	mg/l	0.1	0.1	0.254 (3)	0.075	0.980(3)	0.492(3)
Nickel, filtered	mg/l	0.1	0.1		<0.040	0.083	0.073
Selenium	mg/l	0.05	0.05	<0.005	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05		<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05		<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	0.07 (1)	0.008 (1)	0.011(1)	0.018(1)
Thallium, filtered	mg/l	0.002	–		0.003 (1)	0.005(1)	0.003(1)
Zinc	mg/l	–	5.0	0.567	0.177	0.376	0.759
Zinc, filtered	mg/l	–	5.0		0.028	0.151	0.159

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW–108D JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.008	0.022 (1)	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–					<0.006	<0.006	<0.006
Arsenic	mg/l	0.05	0.05	<0.003	0.018	<0.003	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05					<0.010	<0.010	<0.010
Beryllium	mg/l	0.004	–	<0.0006	0.00202	<0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–					<0.004	<0.004	<0.004
Cadmium	mg/l	0.005	0.005	8.5 (3)	9.6 (3)	1.9 (3)	4.51 (3)	5.41 (3)	10.3(3)	11.6(3)
Cadmium, filtered	mg/l	0.005	0.005					5.08 (3)	9.45(3)	10.8(3)
Chromium	mg/l	0.1	0.1	0.006	0.073 J	0.022	<0.010	<0.010	0.110(3)	<0.010
Chromium, filtered	mg/l	0.1	0.1					<0.010	0.014	<0.010
Copper	mg/l	1.3*	0.65	<0.014	0.045	<0.014	<0.025	<0.025	0.053	<0.025
Copper, filtered	mg/l	1.3*	0.65					<0.025	<0.025	<0.025
Lead	mg/l	0.015*	0.0075	0.023 (3)	0.14 (3)	0.0043	<0.003	<0.003	0.102(3)	0.007
Lead, filtered	mg/l	0.015*	0.0075					<0.003	0.004	<0.003
Mercury	mg/l	0.002	0.002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002
Mercury, filtered	mg/l	0.002	0.002					<0.0002	0.0012	<0.0002
Nickel	mg/l	0.1	0.1	0.46 (3)	0.63 (3)	0.17 (3)	0.313 (3)	0.435 (3)	0.793(3)	0.849(3)
Nickel, filtered	mg/l	0.1	0.1					0.396 (3)	0.564(3)	0.818(3)
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.015	<0.005	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05					<0.005	<0.005	<0.005
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	0.012	<0.010	<0.010
Silver, filtered	mg/l	–	0.05					<0.010	<0.010	<0.010
Thallium	mg/l	0.002	–	0.046 (1)	0.046 (1)	0.028 (1)	<0.050	0.045 (1)	0.094(1)	0.133(1)
Thallium, filtered	mg/l	0.002	–					0.043 (1)	0.101(1)	0.136(1)
Zinc	mg/l	–	5.0	28 (2)	34 (2)	7.6 (2)	18.1 (2)	23.1 (2)	38.6(2)	44.9(2)
Zinc, filtered	mg/l	–	5.0					21.5 (2)	31.3(2)	42.4(2)

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

			ILLINOIS CLASS I	MW–108D QC FIELD DUPLICATE			
Parameter	Unit	MCLs (mg/L)	STANDARDS (mg/L)	JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993
Antimony	mg/l	0.006	–	<0.002	<0.011	<0.060	<0.050
Antimony, filtered	mg/l	0.006	–				
Arsenic	mg/l	0.05	0.05	<0.003	0.023	<0.003	<0.010
Arsenic, filtered	mg/l	0.05	0.05				
Beryllium	mg/l	0.004	–	0.0007	0.00188	<0.0006	<0.005
Beryllium, filtered	mg/l	0.004	–				
Cadmium	mg/l	0.005	0.005	9.0 (3)	9.2 (3)	1.9 (3)	4.42 (3)
Cadmium, filtered	mg/l	0.005	0.005				
Chromium	mg/l	0.1	0.1	0.006	0.084 J	0.029	<0.010
Chromium, filtered	mg/l	0.1	0.1				
Copper	mg/l	1.3*	0.65	<0.014	0.044	<0.014	<0.025
Copper, filtered	mg/l	1.3*	0.65				
Lead	mg/l	0.015*	0.0075	0.026 (3)	0.15 (3)	0.0038	<0.003
Lead, filtered	mg/l	0.015*	0.0075				
Mercury	mg/l	0.002	0.002	<0.0002	0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002				
Nickel	mg/l	0.1	0.1	0.47 (3)	0.64 (3)	0.18 (3)	0.302 (3)
Nickel, filtered	mg/l	0.1	0.1				
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.015	<0.005
Selenium, filtered	mg/l	0.05	0.05				
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010
Silver, filtered	mg/l	–	0.05				
Thallium	mg/l	0.002	–	0.048 (1)	0.051 (1)	0.029 (1)	0.05 (1)
Thallium, filtered	mg/l	0.002	–				
Zinc	mg/l	–	5.0	28 (2)	34 (2)	7.7 (2)	17.9 (2)
Zinc, filtered	mg/l	–	5.0				

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-109 JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.002	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–							
Arsenic	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05							
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–							
Cadmium	mg/l	0.005	0.005	0.0028	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005							
Chromium	mg/l	0.1	0.1	<0.002	<0.013	<0.013	<0.010	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1							
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	<0.025	0.027
Copper, filtered	mg/l	1.3*	0.65							
Lead	mg/l	0.015*	0.0075	0.0046	0.019 (3)	<0.002	<0.003	<0.003	<0.003	<0.003
Lead, filtered	mg/l	0.015*	0.0075							
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002							
Nickel	mg/l	0.1	0.1	<0.023	<0.023	<0.023	0.059	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1							
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05							
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05							
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–							
Zinc	mg/l	–	5.0	0.057	0.077 J	<0.020	<0.020	<0.020	<0.020	<0.020
Zinc, filtered	mg/l	–	5.0							

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW–109–92 JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.002	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–							
Arsenic	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05							
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–							
Cadmium	mg/l	0.005	0.005	0.0018	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005							
Chromium	mg/l	0.1	0.1	0.003	0.021 U	<0.013	<0.010	0.011	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1							
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	<0.025	0.154
Copper, filtered	mg/l	1.3*	0.65							
Lead	mg/l	0.015*	0.0075	0.018 (3)	0.0038	<0.002	<0.003	<0.003	<0.003	<0.003
Lead, filtered	mg/l	0.015*	0.0075							
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002							
Nickel	mg/l	0.1	0.1	<0.023	<0.023	<0.023	<0.040	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1							
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05							
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05							
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–							
Zinc	mg/l	–	5.0	0.081	0.057 J	<0.020	<0.020	<0.020	<0.020	0.069
Zinc, filtered	mg/l	–	5.0							

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-110 JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994	MW-110 QC FIELD DUPLICATE JULY 1994
Antimony	mg/l	0.006	–	<0.002	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–								
Arsenic	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05								
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–								
Cadmium	mg/l	0.005	0.005	0.0013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005								
Chromium	mg/l	0.1	0.1	<0.002	<0.013	<0.013	<0.010	<0.010	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1								
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	0.043	0.084	0.070
Copper, filtered	mg/l	1.3*	0.65								
Lead	mg/l	0.015*	0.0075	0.0042	0.017 (3)	<0.002	<0.003	<0.003	<0.003	<0.003	<0.003
Lead, filtered	mg/l	0.015*	0.0075								
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002								
Nickel	mg/l	0.1	0.1	<0.023	0.033	<0.023	<0.040	<0.040	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1								
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005 J	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05								
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05								
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–								
Zinc	mg/l	–	5.0	0.043	0.078	<0.020	<0.020	<0.020	0.092	0.051	0.081
Zinc, filtered	mg/l	–	5.0								

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Table 1-5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-111-92 JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.002	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–							
Arsenic	mg/l	0.05	0.05	0.0046	0.0037	<0.003	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05							
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–							
Cadmium	mg/l	0.005	0.005	<0.0003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005							
Chromium	mg/l	0.1	0.1	<0.002	0.024 U	<0.013	<0.010	<0.010	0.015	<0.010
Chromium, filtered	mg/l	0.1	0.1							
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	0.029	<0.025
Copper, filtered	mg/l	1.3*	0.65							
Lead	mg/l	0.015*	0.0075	0.003	0.009 (2)	<0.002	<0.003	<0.003	<0.003 UJ	<0.003
Lead, filtered	mg/l	0.015*	0.0075							
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002							
Nickel	mg/l	0.1	0.1	<0.023	<0.023	<0.023	<0.040	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1							
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005 UJ	<0.005
Selenium, filtered	mg/l	0.05	0.05							
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05							
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–							
Zinc	mg/l	–	5.0	0.043	0.073	<0.020	<0.020	<0.020	0.088	<0.020
Zinc, filtered	mg/l	–	5.0							

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-111-92 QC FIELD DUPLICATE JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	OCTOBER 1994
Antimony	mg/l	0.006	–	<0.002	<0.011	<0.060	<0.050	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–						
Arsenic	mg/l	0.05	0.05	0.004	<0.003	<0.003	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05						
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–						
Cadmium	mg/l	0.005	0.005	0.0004	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005						
Chromium	mg/l	0.1	0.1	<0.002	0.027 U	<0.013	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1						
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	<0.025
Copper, filtered	mg/l	1.3*	0.65						
Lead	mg/l	0.015*	0.0075	0.0094 (2)	0.0072	<0.002	<0.003	<0.003	<0.003
Lead, filtered	mg/l	0.015*	0.0075						
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002						
Nickel	mg/l	0.1	0.1	<0.023	<0.023	<0.023	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1						
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05						
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05						
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002
Thallium, filtered	mg/l	0.002	–						
Zinc	mg/l	–	5.0	0.059	0.068	<0.020	<0.020	<0.020	<0.020
Zinc, filtered	mg/l	–	5.0						

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Table 1-5: Metals Results of
Historical Groundwater Sampling Events
NL/Taracorp Superfund Site

Parameter	Unit	MCLs (mg/L)	ILLINOIS CLASS I STANDARDS (mg/L)	MW-112 QC RINSATE BLANK JULY 1992	OCTOBER 1992	MARCH 1993	SEPTEMBER 1993	APRIL 1994	JULY 1994	OCTOBER 1994	MW-113 QC RINSATE APRIL 1994
Antimony	mg/l	0.006	–	<0.002	<0.011	<0.060	<0.050	<0.006	<0.006	<0.006	<0.006
Antimony, filtered	mg/l	0.006	–								
Arsenic	mg/l	0.05	0.05	0.0032	<0.003	<0.003	<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic, filtered	mg/l	0.05	0.05								
Beryllium	mg/l	0.004	–	<0.0006	<0.0006	<0.0006	<0.005	<0.004	<0.004	<0.004	<0.004
Beryllium, filtered	mg/l	0.004	–								
Cadmium	mg/l	0.005	0.005	<0.0003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium, filtered	mg/l	0.005	0.005								
Chromium	mg/l	0.1	0.1	<0.002	<0.013	<0.013	<0.010	<0.010	<0.010	<0.010	<0.010
Chromium, filtered	mg/l	0.1	0.1								
Copper	mg/l	1.3*	0.65	<0.014	<0.014	<0.014	<0.025	<0.025	<0.025	<0.025	<0.025
Copper, filtered	mg/l	1.3*	0.65								
Lead	mg/l	0.015*	0.0075	<0.002	<0.002	<0.002	<0.003	<0.003	<0.003	<0.003	<0.003
Lead, filtered	mg/l	0.015*	0.0075								
Mercury	mg/l	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercury, filtered	mg/l	0.002	0.002								
Nickel	mg/l	0.1	0.1	<0.023	<0.023	<0.023	<0.040	<0.040	<0.040	<0.040	<0.040
Nickel, filtered	mg/l	0.1	0.1								
Selenium	mg/l	0.05	0.05	<0.003	<0.003	<0.003	<0.005	<0.005	<0.005	<0.005	<0.005
Selenium, filtered	mg/l	0.05	0.05								
Silver	mg/l	–	0.05	<0.0004	<0.009	<0.009	<0.010	<0.010	<0.010	<0.010	<0.010
Silver, filtered	mg/l	–	0.05								
Thallium	mg/l	0.002	–	<0.002	<0.002	<0.002	<0.050	<0.002	<0.002	0.003(1)	<0.002
Thallium, filtered	mg/l	0.002	–								
Zinc	mg/l	–	5.0	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Zinc, filtered	mg/l	–	5.0								

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Table 1–5: Metals Results of Historical Groundwater Sampling Events NL/Taracorp Superfund Site

Notes:

U – The compound was analyzed for but was not detected. The associated numerical value is attributed to contamination and is considered to be the sample quantitation limit.

J – The associated numerical value is an estimated quantity.

* – Action Level that triggers treatment.

(1) – Sample concentration is above the MCL.

(2) – Sample concentration is above the Illinois Groundwater Quality Standard for a Class I Potable Resource.

(3) – Sample Concentration is above both the MCL and the Illinois Class I Groundwater Quality Standard Illinois Class I Groundwater Quality Standard.

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TABLE 2-1
EVALUATION OF PROCESS OPTIONS
SOLID MEDIA – MAIN INDUSTRIAL SITE AND REMOTE FILL AREAS

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
INSTITUTIONAL ACTION	ACCESS RESTRICTIONS	FENCING LAND USE RESTRICTIONS DEED RESTRICTIONS	DEPENDS ON CONTINUED FUTURE MAINTENANCE DOES NOT REDUCE CONTAMINATION	REQUIRES LEGAL AND REGULATORY PROCEDURES AND AUTHORITY	NEGLIGIBLE COST
	MONITORING	AIR MONITORING (DUST CONTROL)	USEFUL IN DOCUMENTING CONDITIONS; DOES NOT REDUCE RISK	NOT ACCEPTABLE AS A STAND ALONE OPTION	LOW CAPITAL LONG TERM O & M
CONTAINMENT ACTION (SOLID MEDIA)	CAPPING	RCRA OR MULTI MEDIA CAP	EFFECTIVE SHORT TERM LONG TERM UNCERTAINTIES	LAND USE RESTRICTIONS REQUIRED; LOCAL GOVERNMENT OPPOSED	LOW CAPITAL LONG TERM O & M
		ASPHALT	EFFECTIVE SHORT TERM; SUSCEPTABLE TO WEATHERING & CRACKING	LAND USE RESTRICTIONS REQUIRED; LOCAL GOVERNMENT OPPOSED	LOW CAPITAL LONG TERM O & M
		GEOFABRIC	EFFECTIVE IN CONJUNCTION WITH RCRA CAP	LAND USE RESTRICTIONS REQUIRED; LOCAL GOVERNMENT OPPOSED	LOW CAPITAL LOW O & M
	LINER	CLAY	EFFECTIVE IN CONJUNCTION WITH RCRA CAP	LAND USE RESTRICTIONS REQUIRED; LOCAL GOVERNMENT OPPOSED	LOW CAPITAL LOW O & M
		HDPE LINER	EFFECTIVE IN CONJUNCTION WITH RCRA CAP	LAND USE RESTRICTIONS REQUIRED; LOCAL GOVERNMENT OPPOSED	LOW CAPITAL LOW O & M
REMOVAL ACTION (SOLID MEDIA)	EXCAVATION	FRONT END LOADER, BACKHOE, MISCILLANEOUS HEAVY EQUIPMENT	EFFECTIVE AND RELIABLE	EASILY IMPLEMENTABLE	HIGH CAPITAL LOW O & M
		HAND TOOLS SMALL EQUIPMENT	EFFECTIVE AND RELIABLE	WILL INVOLVE SOME DISRUPTION OF RESIDENTS AND TRAFFIC IN RESIDENTIAL AREAS	HIGH CAPITAL LOW O & M

TABLE 2-1
EVALUATION OF PROCESS OPTIONS
SOLID MEDIA – MAIN INDUSTRIAL SITE AND REMOTE FILL AREAS

TREATMENT ACTION (SOLID MEDIA)	RECYCLE/ RECOVERY	SEGREGATION (CANONIE, OHM)	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	MODERATELY DIFFICULT TO IMPLEMENT	HIGH CAPITAL LOW O & M
		SECONDARY SMELTER (DOE RUN; EXIDE)	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	TRANSPORTATION MANIFESTS, PERMITS REQUIRED TO IMPLEMENT	HIGH CAPITAL LOW O & M
	SOLIDIFICATION/ STABILIZATION/ FIXATION	HERITAGE CANONIE OHM	EFFECTIVE AND RELIABLE	READILY IMPLEMENTABLE	HIGH CAPITAL LOW O & M
		COLD MIX ASPHALT (AES)	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	DEPENDS ON REGULATORS, NATURE OF CONTAMINATED MATERIAL, MARKET FOR ASPHALT PRODUCT	MODERATE CAPITAL MODERATE O & M
	CHEMICAL/ PHYSICAL TREATMENT	INSITU STABILIZATION (HERITAGE)	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	NOT READY FOR IMPLEMENTATION; STILL AN R & D PROCESS	HIGH CAPITAL HIGH O & M
		INSITU VITRIFICATION	NOT APPLICABLE IN THIS SETTING	BATTERY CASING MATERIAL IN THE SOIL WOULD CREATE FIRE HAZARD	HIGH CAPITAL HIGH O & M
		EXSITU VITRIFICATION	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	MODERATELY DIFFICULT TO IMPLEMENT; REQUIRES SPECIALIZED EQUIPMENT	HIGH CAPITAL LOW O & M
		ACID LEACHING / WASHING (CANONIE, OHM, ETT)	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	MODERATELY DIFFICULT TO IMPLEMENT; REQUIRES SPECIALIZED EQUIPMENT	HIGH CAPITAL LOW O & M
		SOIL WASHING (ETT)	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	DIFFICULT TO IMPLEMENT DUE TO NATURE OF SOILS ON SITE	HIGH CAPITAL MODERATE O & M
		PHYTOREMEDIATION (DUPONT)	PILOT STUDY REQUIRED TO DETERMINE EFFECTIVENESS	NOT READY TO IMPLEMENT; STILL IN R & D	LOW CAPITAL HIGH O & M
DISPOSAL ACTION (SOLID MEDIA)	LAND DISPOSAL	HAZARDOUS WASTE TO RCRA TSD FACILITY	EFFECTIVE DUE TO SOURCE REMOVAL	RELATIVELY EASY TO IMPLEMENT; DISPOSAL PERMITS REQUIRED	HIGH CAPITAL LOW O & M
		NON-HAZARDOUS WASTE TO SPECIAL WASTE LANDFILL	EFFECTIVE DUE TO SOURCE REMOVAL	RELATIVELY EASY TO IMPLEMENT; DISPOSAL PERMITS REQUIRED	HIGH CAPITAL LOW O & M
		ONSITE LANDFILL CELL	EFFECTIVE FOR NON-INDUSTRIAL AREAS	RELATIVELY EASY TO IMPLEMENT; DISPOSAL PERMITS REQUIRED	HIGH CAPITAL HIGH O & M

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TABLE 2-2
EVALUATION OF PROCESS OPTIONS FOR GROUNDWATER

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
INSTITUTIONAL ACTION	ACCESS RESTRICTIONS	LAND USE RESTRICTIONS DEED RESTRICTIONS	DEPENDS ON CONTINUED FUTURE MAINTENANCE DOES NOT REDUCE CONTAMINATION	REQUIRES LEGAL AND REGULATORY PROCEDURES AND AUTHORITY	NEGLIGIBLE COST
	MONITORING	GROUNDWATER MONITORING	USEFUL IN DOCUMENTING CONDITIONS; DOES NOT REDUCE RISK	NOT ACCEPTABLE AS A STAND ALONE OPTION	LOW CAPITAL LONG TERM O & M
COLLECTION / CONTAINMENT (LIQUID MEDIA)	NATURAL ATTENUATION	SOURCE REMOVAL (PILE)	EFFECTIVE AS LONG AS GROUNDWATER IS NOT A DRINKING SOURCE PRIOR TO ATTAINMENT OF MCLs	NEED TO IDENTIFY HOW AND WHERE PILES ARE TO BE DISPOSED OF	HIGH CAPITAL LOW O & M FOR LONG TERM MONITORING
	LEACHATE COLLECTION	DRAINAGE UNDERLAY SYSTEM	CAN BE AN EFFECTIVE SOLUTION IF PILE REMAINS	DISTURBS PILE WITHOUT REMOVING IT	HIGH CAPITAL HIGH O & M
		INTERCEPTOR TRENCHES	CAN BE AN EFFECTIVE SOLUTION IF PILE REMAINS	DISTURBS PILE WITHOUT REMOVING IT	HIGH CAPITAL HIGH O & M
	VERTICAL BARRIERS	SLURRY WALL	CONTAINS CONTAMINATION DOES NOT ELIMINATE IT	REQUIRES DEEP TRENCH INTO TOP OF BEDROCK	HIGH CAPITAL LOW O & M
		GROUT CURTAIN	CONTAINS CONTAMINATION DOES NOT ELIMINATE IT	REQUIRES DEEP INJECTION WELLS TO TOP OF BEDROCK	HIGH CAPITAL LOW O & M
		SHEET PILES	NOT EFFECTIVE IN THIS SETTING	DOES NOT PROVIDE AN ADEQUATE SEAL	MODERATE CAPITAL LOW O & M
	HORIZONTAL BARRIERS	GROUT INJECTION	EFFECTIVE IN CONJUNCTION WITH LEACHATE COLLECTION SYSTEM	REQUIRES A SERIES OF HORIZONTAL CONDUITS UNDER PILE	HIGH CAPITAL HIGH O & M FOR LEACHATE DISPOSAL

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TABLE 2-2
EVALUATION OF PROCESS OPTIONS FOR GROUNDWATER

COLLECTION/ TREATMENT/ DISCHARGE (LIQUID MEDIA)	EXTRACTION	EXTRACTION WELLS	EFFECTIVE IN CONJUNCTION WITH SOURCE REMOVAL	REQUIRES DISPOSAL OF LARGE VOLUMES OF CONTAMINATED WATER AND DISPOSAL PERMITS	HIGH CAPITAL HIGH O & M
	ONSITE TREATMENT (EXSITU)	PUMP AND TREAT SYSTEM	NOT EFFECTIVE IN A REASONABLE TIMEFRAME	REQUIRES DISPOSAL OF LARGE VOLUMES OF CONTAMINATED WATER AND DISPOSAL PERMITS	HIGH CAPITAL HIGH O & M FOR LEACHATE DISPOSAL, WELL O & M
	OFFSITE TREATMENT	POTW	EFFECTIVE PERMANENT SOLUTION	REQUIRES ACCEPTANCE BY LOCAL POTW	LOW CAPITAL HIGH O & M
		RCRA FACILITY	EFFECTIVE PERMANENT SOLUTION	TRANSPORTATION OF CONTAMINATED WATER REQUIRES MANIFESTING & AND DISPOSAL PERMITS	LOW CAPITAL HIGH O & M
	INSITU TREATMENT	CHEMICAL INJECTION	NOT FEASIBLE FOR LEAD	EXTREMELY DIFFICULT TO MONITOR EFFECTIVENESS	HIGH CAPITAL HIGH O & M
	ONSITE DISCHARGE	DEEP INJECTION	DOES NOT ADDRESS ULTIMATE FATE OF CONTAMINATION	NOT ACCEPTABLE TO REGULATORS OF LOCAL GOVERNMENT	HIGH CAPITAL HIGH O & M
	OFFSITE DISCHARGE	POTW	EFFECTIVE AND RELIABLE	REQUIRES ACCEPTANCE BY POTW	LOW CAPITAL HIGH O & M
		DEEP INJECTION	DOES NOT ADDRESS ULTIMATE FATE OF CONTAMINATION	NOT ACCEPTABLE TO REGULATORS OF LOCAL GOVERNMENT	HIGH CAPITAL HIGH O & M
		PIPELINE TO RIVER	DOES NOT ADDRESS ULTIMATE FATE OF CONTAMINATION	NOT ACCEPTABLE TO REGULATORS OF LOCAL GOVERNMENT	MODERATE CAPITAL MODERATE O & M

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TABLE 2-3: INITIAL SCREENING OF TECHNOLOGIES & PROCESS OPTIONS
SOLID MEDIA - MAIN INDUSTRIAL SITE AND REMOTE FILL AREAS

GENERAL RESPONSE ACTION	REMEDIATION TECHNOLOGY	PROCESS OPTIONS	APPLICABLE MEDIA	SCREENING COMMENTS
INSTITUTIONAL ACTION	ACCESS RESTRICTIONS	FENCING LAND USE RESTRICTIONS DEED RESTRICTIONS	ALL	RETAINED
	MONITORING	AIR MONITORING (DUST CONTROL)	AIR	RETAINED
CONTAINMENT ACTION (SOLID MEDIA)	CAPPING	RCRA MULTI-MEDIA CAP ASPHALT GEOFABRIC	PILES	RETAINED
	LINER	CLAY GEOFABRIC	PILES ONSITE LANDFILL	RETAINED - APPLICABLE TO ONSITE LANDFILL
REMOVAL ACTION (SOLID MEDIA)	EXCAVATION	FRONT END LOADER, BACKHOE, MISCILLANEOUS HEAVY EQUIPMENT	PILES REMOTE FILL SOIL	RETAINED
		HAND TOOLS SMALL EQUIPMENT	RESIDENTIAL REMOTE FILL	RETAINED
TREATMENT ACTION (SOLID MEDIA)	RECYCLE/RECOVERY	SEGREGATION (CANONIE; OHM)	PILES REMOTE FILL	RETAINED
		SECONDARY SMELTER (EXIDE; DOE RUN)	PILES	RETAINED
	SOLIDIFICATION/ STABILIZATION/ FIXATION	CANONIE HERITAGE OHM	PILES REMOTE FILL SOIL	RETAINED
		COLD MIX ASPHALT (AES)	REMOTE FILL SOIL	RETAINED
	CHEMICAL/ PHYSICAL TREATMENT	INSITU STABILIZATION	PILES	EXPERIMENTAL
		ACID LEACHING/WASHING (CANONIE; ETT; OHM)	PILES	RETAINED
		SOIL WASHING (ETT)	REMOTE FILL SOIL	RETAINED
		PHYTOREMEDIATION	SOIL	EXPERIMENTAL
		INSITU VITRIFICATION	PILES REMOTE FILL	BATTERY CASING MATERIAL WOULD CREATE FIRE HAZARD
		EXSITU VITRIFICATION	PILES REMOTE FILL SOIL	COST PROHIBITIVE
DISPOSAL ACTION (SOLID MEDIA)	LAND DISPOSAL	HAZARDOUS WASTE TO RCRA LANDFILL	PILES REMOTE FILL SOIL	RETAINED
		NON-HAZARDOUS WASTE TO SPECIAL LANDFILL	PILES REMOTE FILL SOIL	RETAINED
		ONITE LANDFILL	PILES REMOTE FILL SOIL	RETAINED

TABLE 2-4: INITIAL SCREENING OF TECHNOLOGIES & PROCESS OPTIONS
GROUNDWATER

GENERAL RESPONSE ACTION	REMEDIATION TECHNOLOGY	PROCESS OPTIONS	APPLICABLE MEDIA	SCREENING COMMENTS
INSTITUTIONAL ACTION	ACCESS RESTRICTIONS	LAND USE RESTRICTIONS DEED RESTRICTIONS	ALL	RETAINED
	MONITORING	GROUNDWATER MONITORING	GROUNDWATER	RETAINED
COLLECTION/ CONTAINMENT (LIQUID MEDIA)	NATURAL ATTENUATION	SOURCE REMOVAL (PILE)	GROUNDWATER PILE	RETAINED - APPLICABLE LONG TERM MONITORING REQUIRED
	VERTICAL BARRIERS	SLURRY WALL	GROUNDWATER	EXPENSIVE SOLUTION
		GROUT CURTAIN	GROUNDWATER	COST PROHIBITIVE
		SHEET PILES	GROUNDWATER	INEFFECTIVE REMEDY
	LEACHATE COLLECTION	DRAINAGE UNDERLAY SYSTEM	GROUNDWATER	LIMITED POTENTIAL APPLICATIONS; DISTURBS WITHOUT REMOVING IT
		INTERCEPTOR TRENCHES	GROUNDWATER	LIMITED POTENTIAL APPLICATIONS; DISTURBS WITHOUT REMOVING IT
	HORIZONTAL BARRIERS	GROUT INJECTION	GROUNDWATER	COST PROHIBITIVE
COLLECTION/ TREATMENT/ DISCHARGE (LIQUID MEDIA)	EXTRACTION	EXTRACTION WELLS	GROUNDWATER	RETAINED
	ONSITE TREATMENT (EXSITU)	PUMP AND TREAT SYSTEM	GROUNDWATER	RETAINED HIGH LONGTERM O & M
	OFFSITE TREATMENT	POTW	GROUNDWATER	RETAINED
		RCRA FACILITY	GROUNDWATER	HIGH TRANSPORTATION COSTS
	INSITU TREATMENT	CHEMICAL INJECTION	GROUNDWATER	INEFFECTIVE REMEDY
	ONSITE DISCHARGE	DEEP INJECTION	GROUNDWATER	UNACCEPTABLE TO AGENCIES
	OFFSITE DISCHARGE	POTW	GROUNDWATER	RETAINED
		DEEP INJECTION	GROUNDWATER	UNACCEPTABLE TO AGENCIES
		PIPELINE TO RIVER	GROUNDWATER	WOULD REQUIRE PRETREATMENT

TABLE 3-1: REMEDIAL ALTERNATIVES MATRIX
MAIN INDUSTRIAL AREA - SOLID MEDIA
NL/TARACORP SUPERFUND SITE

AFFECTED AREA	TECHNOLOGY	PROCESS	REMEDIAL ALTERNATIVES M-A SOURCE REMOVAL TO ONSITE LANDFILL NO TREATMENT	M-B SOURCE REMOVAL TO ONSITE LANDFILL ON-SITE TREATMENT	M-C1 SOURCE REMOVAL TO OFFSITE LANDFILL OFFSITE TREATMENT	M-C2 SOURCE REMOVAL TO OFFSITE LANDFILL ONSITE TREATMENT	M-D SOURCE REMOVAL TO OFFSITE LANDFILL OFFSITE RECYCLING DISPOSAL
TARACORP PILE SLLR PILE	MINIMIZE EXPOSURE	FENCE & DEED RESTRICTIONS	X	X	X	X	X
	CONTAINMENT	RCRA CAP	X	X			X
		LINER FOR ONSITE LANDFILL	X	X			
	EXCAVATION & REMOVAL	HEAVY EQUIPMENT			X	X	X
	TREATMENT & RECYCLING	ONSITE SEPARATION & TREATMENT		X		X	X
		OFFSITE TREATMENT, RECYCLING			X		X
	DISPOSAL	OFFSITE RCRA OR SPECIAL LANDFILL			X	X	X
MAIN INDUSTRIAL SITE SOIL	EXCAVATION & REMOVAL	HEAVY EQUIPMENT	X	X	X	X	X
	TREATMENT & RECYCLING	ONSITE TREATMENT				X	X
		OFFSITE TREATMENT, RECYCLING			X		X
	DISPOSAL	ONSITE WITH TARACORP PILE	X	X			
		OFFSITE RCRA OR SPECIAL LANDFILL			X	X	X

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TABLE 3-2: REMEDIAL ALTERNATIVES MATRIX
REMOTE FILL AREAS - SOLID MEDIA
NL/TARACORP SUPERFUND SITE

GENERAL RESPONSE ACTION			REMEDIAL ALTERNATIVES	
AFFECTED AREAS	TECHNOLOGY	PROCESS	RF-A REMOVAL OF RESIDENTIAL REMOTE FILL ; CAP ALLEYS AND DRIVES WITH ASPHALT	RF-B REMOVAL OF REMOTE FILL TO ONSITE OR OFFSITE LANDFILL; WITH EITHER ONSITE OR OFFSITE TREATMENT
REMOTE FILL AREAS	MINIMIZE EXPOSURE	FENCE & DEED RESTRICTIONS	X	
	CONTAINMENT	CAP IN ACCORDANCE WITH USAGE	X	
	EXCAVATE, REMOVE & RESTORE	HEAVY EQUIPMENT MANUAL EXCAVATION	X	X
	TREATMENT, RECYCLING	ONSITE SEPARATION & TREATMENT	X	X
		OFFSITE TREATMENT, RECYCLING, DISPOSAL	X	X
	DISPOSAL	OFFSITE OR ONSITE LANDFILL	X	X

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TABLE 3-3
REMEDIAL ALTERNATIVES MATRIX – GROUNDWATER
NL/TARACORP SUPERFUND SITE

GENERAL RESPONSE ACTION			REMEDIAL ALTERNATIVES		
MEDIUM	TECHNOLOGY	PROCESS	G-A MONITORING AND NATURAL ATTENUATION	G-B GROUNDWATER CONTAINMENT ON MAIN INDUSTRIAL SITE BY PUMPING & DISPOSAL INTO LOCAL POTW; MONITORING FOR OTHER AREAS	G-C GROUNDWATER CONTAINMENT ON MAIN INDUSTRIAL SITE BY SLURRY WALL, PUMPING & DISPOSAL INTO LOCAL POTW MONITORING FOR OTHER AREAS
GROUNDWATER	MINIMIZE EXPOSURE	USAGE RESTRICTIONS	X	X	X
	MONITORING	SAMPLING	X	X	X
	EXTRACTION	PUMP & TREAT		X	X
	DISPOSAL	POTW		X	X

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TABLE 3-4
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA - MAIN INDUSTRIAL PROPERTY - ALTERNATIVE M-A
Source Removal to Onsite Landfill

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
- TARACORP PILE				
Grading, Contouring, Consolidation	61000	CY	1	$61,000
Buy, Haul, Place Clay (cap & liner)	59800	CY	14	837,200
Buy, Place 60ml HDPE Liner (cap)	335000	SF	1.25	418,750
Buy, Haul, Place Sand/Gravel (cap)	13500	CY	15	202,500
Buy, Haul, Place Geotextile Filter Fabric	335000	SF	0.22	73,700
Buy, Haul, Place Topsoil	28500	CY	24	684,000
Buy, Haul, Place Toe Drain	2360	FT	2	4,720
- SLLR PILES				
Heavy Excavation	6400	CY	1.8	11,520
Transportation to Taracorp Pile	6400	CY	3	19,200
- MAIN INDUSTRIAL AREA (includes piles)				
Heavy Excavation	35000	CY	1.8	63,000
Buy, Haul, Place Clean fill	24100	CY	13	313,300
Seed, Fertilizer, Mulch	72800	SY	0.4	29,120
Fencing	1800	FT	12	21,600
Clear and Grub	0.52	ACRE	2800	1,460
Deed Restrictions	1	LS	15000	15,000
Dust Control	100	DAY	770	77,000
Ambient Air Monitoring	50	DAY	1600	80,000
SUBTOTAL				$2,913,070
Mobilization (10% of subtotals)				$291,307
SUBTOTAL CONSTRUCTION COSTS				$3,204,377

TABLE 3-4
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA - MAIN INDUSTRIAL PROPERTY - ALTERNATIVE M-A
Source Removal to Onsite Landfill

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
-CONTINGENCY				
(15% of Subtotal)				$480,657
-OTHER				
Administrative/Permitting (5% of Total)				$160,219
Surveying				$10,000
Safety Program				$10,000
Equipment Decontamination				$5,000
Engineering Design (10% of Total)				$320,4[illegible]
Construction Services (10% of Total)				$320,4[illegible]
SUBTOTAL				$1,306,751
TOTAL ESTIMATED CAPITAL COSTS				$4,511,128
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				9 to 15 months
ANNUAL OPERATING & MAINTENANCE COSTS				
Air Monitoring Labor	3	Day	275	825
Air Monitoring Sample Analysis	8	Ea	1010	8,080
Misc. Site Work	15	Day	275	4,125
Misc. Equipment & Supplies	LS	LS	4400	4,400
Landfill Maintenance	LS	LS	1300	1,300
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$18,7[illegible]

TABLE 3–5
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA – MAIN INDUSTRIAL PROPERTY – ALTERNATIVE M–B
Source Removal to Onsite Landfill – Treatment Required

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– TARACORP PILE				
Grading, Contouring, Consolidation	218000	CY	1	$218,000
Excavation & On–site Stabilization (1)	220000	TON	55	12,100,000
Buy, Haul, Place Clay Fill (liner)	38700	CY	14	541,800
Buy, Place 60ml HDPE Liner (cap & liner)	700000	SF	1.25	875,000
Buy, Haul, Place Geotextile Filter Fabric	348000	SF	0.22	76,560
Buy, Haul, Place Aggregate(drainage)	12900	CY	15	193,500
Buy, Place 6" PVC pipe	1900	FT	2	3,800
Buy, Haul, Place Toe Drain	2550	FT	2	5,100
– SLLR PILES				
Excavation & On–site Stabilization (1)	5400	TON	55	297,000
– MAIN INDUSTRIAL AREA (Soil)				
Excavation & On–site Stabilization (1)	64900	TON	55	3,569,500
Buy, Haul, Place Clean fill	24100	CY	13	313,300
Clear and Grub	0.52	ACRE	2800	1,460
Seed, Fertilizer, Mulch	72800	SY	0.4	29,120
Fencing	1800	FT	12	21,600
Deed Restrictions	1	LS	15000	15,000
Ambient Air Monitoring	105	DAY	1600	168,000
Dust Control	240	DAY	770	184,800
SUBTOTAL				$18,613,540
Mobilization (10% of subtotal)				$1,861,354
SUBTOTAL CONSTRUCTION COSTS				$20,474,894

(1) Excavation and on–site stabilization unit cost based on a pilot treatability study.

TABLE 3-5
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA – MAIN INDUSTRIAL PROPERTY – ALTERNATIVE M-B
Source Removal to Onsite Landfill – Treatment Required

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$3,071,234
–OTHER				
Administration/Permitting(5% of Total)				$1,023,745
Surveying				$10,000
Safety Program				$15,000
Equipment Decontamination				$20,000
Engineering Design (10% of Total)				$2,047,489
Construction Services (10% of Total)				$2,047,4[illegible]
SUBTOTAL				$8,234,956
TOTAL ESTIMATED CAPITAL COSTS				$28,709,852
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				12 to 18 mos.
ANNUAL OPERATING & MAINTENANCE COSTS				
Air Monitoring Labor	2	Day	1000	2,0[illegible]
Air Monitoring Sample Analysis	8	Ea	1000	8,000
Misc. Site Work	15	Day	275	4,125
Misc. Equipment & Supplies	LS	LS	4500	4,500
Landfill Maintenance	LS	LS	1500	1,500
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$20,1[illegible]

TABLE 3-6
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA – MAIN INDUSTRIAL PROPERTY – ALTERNATIVE M-C1
Source Removal to Offsite Landfill with Stabilization

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– TARACORP PILE & MAIN INDUSTRIAL AREA SOIL				
Heavy Excavation	166000	CY	1.8	$298,800
Load	166000	CY	1	166,000
Off-site Treatment/Disposal	281000	TON	115	32,315,000
Buy, Haul, Place Clay Fill	80700	CY	14	1,129,800
Seed, Fertilizer, Mulch	72900	SY	0.4	29,160
Fencing	450	FT	12	5,400
Transportation	11700	LOAD	610	7,137,000
Dust Control	120	DAY	770	92,400
Ambient Air Monitoring	60	DAY	1600	96,000
– SLLR PILES				
Clear and Grub	0.52	ACRE	2800	1,456
Heavy Excavation	6400	CY	1.8	11,520
Load	6400	CY	1	6,400
Off-site Treatment/Disposal	5400	TON	115	621,000
Transportation	225	LOAD	610	137,250
SUBTOTAL				$42,047,186
Mobilization (10% of Subtotal)				$4,204,719
SUBTOTAL CONSTRUCTION COSTS				$46,251,905
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$6,937,786
–OTHER				
Administrative/Permitting (5% of Total)				$2,312,595
Surveying				$10,000
Safety Program				$10,000
Equipment Decontamination				$15,000
Engineering Design (10% of Total)				$4,625,190
Construction Services (10% of Total)				$4,625,190
SUBTOTAL				$18,535,762
TOTAL ESTIMATED CAPITAL COSTS				$64,787,666
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				6 to 12 mos
ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-7
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA - MAIN INDUSTRIAL PROPERTY - ALTERNATIVE M-C2
Source Removal to Offsite Landfill with On-site Stabilization

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
- TARACORP PILE & MAIN INDUSTRIAL AREA SOIL				
Excavation & On-site Treatment (Soil)	64900	TON	55	3,569,500
Excavation & On-site Treatment (Slag)	220000	TON	55	12,100,000
Transportation to Off-site Landfill	210000	CY	8	1,680,000
Off-site Disposal (Special)	210000	CY	15	3,150,000
Buy, Haul, Place Clay Fill	80700	CY	14	1,129,800
Seed, Fertilizer, Mulch	72900	SY	0.4	29,160
Dust Control	210	DAY	770	161,700
Ambient Air Monitoring	100	DAY	1600	160,0[illegible]
- SLLR PILES				
Clear and Grub	0.52	ACRE	2800	1,456
Excavation & On-site Treatment	5400	TON	55	297,000
Transportation to Off-site Landfill	8100	CY	8	64,800
Off-site Disposal (Special)	8100	CY	15	121,500
SUBTOTAL				$22,464,9[illegible]
Mobilization (10% of Subtotal)				$2,246,492
SUBTOTAL CONSTRUCTION COSTS				$24,711,408

(1) Excavation & on-site treatment unit cost based on a pilot treatability study.

TABLE 3-7
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA - MAIN INDUSTRIAL PROPERTY - ALTERNATIVE M-C2
Source Removal to Offsite Landfill with On-site Stabilization

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
-CONTINGENCY				
Bid (15% of Subtotal)				$3,706,711
-OTHER				
Administrative/Permitting (5% of Total)				$1,235,570
Surveying				$10,000
Safety Program				$10,000
Equipment Decontamination				$15,000
Engineering Design (10% of Total)				$2,471,141
Construction Services (10% of Total)				$2,471,141
SUBTOTAL				$9,919,563
TOTAL ESTIMATED CAPITAL COSTS				$34,630,971
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				10 to 16 mos.
ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-8
PRELIMINARY COST AND TIME ESTIMATES
SOIL/WASTE MEDIA – MAIN INDUSTRIAL PROPERTY – ALTERNATIVE M-D
Source Removal; Onsite Sorting/Treatment, Offsite Recycle/Disposal

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– TARACORP PILE & MAIN INDUSTRIAL AREA SOIL				
Heavy Excavation	166000	CY	1.8	$298,800
Onsite Sorting	166000	CY	10	1,660,000
Treatment (Soil)	64900	TON	55	3,569,500
Load (after Stabilization)	60800	CY	1	60,800
Transportation	60800	CY	8	486,400
Disposal (Special Waste)	60800	CY	15	912,000
Load (Taracorp Pile)	118000	CY	1	118,000
Transportation to Smelter	9170	LOAD	930	8,528,100
Material sent to Secondary Smelter	220000	TON	175	38,500,000
Buy, Haul, Place Clean Fill	80700	CY	13	1,049,1[illegible]
Seed, Fertilizer, Straw	72900	SY	0.4	29,[illegible]
Dust Control	220	DAY	770	169,4[illegible]
Ambient Air Monitoring	100	DAY	1600	160,000
– SLLR PILES				
Clear and Grub	0.52	ACRE	2800	1,456
Heavy Excavation	6400	CY	1.8	11,520
Load	6400	CY	1	6,400
Ebonite Recycle	5400	TON	175	945,000
Transportation to Recycling Center	225	LOAD	930	209,[illegible]
SUBTOTAL				$56,714,886
Mobilization (10% of subtotal)				$5,671,489
SUBTOTAL CONSTRUCTION COSTS				$62,386,375
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$9,357,956
–OTHER				
Administrative/Permitting (5% of Total)				$3,119,319
Surveying				$10,000
Engineering Design (10% of Total)				$6,238,637
Construction Services (10% of Total)				$6,238,637
SUBTOTAL				$24,964,550
TOTAL ESTIMATED CAPITAL COSTS				$87,350,924
ESTIMATED TIME TO REMEDIATE (excludes bid, design, and admin.)				11 to 17 mos.
ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-9
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA – REMOTE FILL AREAS – ALTERNATIVE RF-A1
ON-SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– REMOTE FILL IN RESIDENTIAL AREAS				
Clear/Replace incidentals	12090	SY	0.51	$6,166
Manual Excavation	160	CY	58	9,280
Light Excavation	3020	CY	2.4	7,248
Load	3180	CY	0.50	1,590
Place Asphalt Pavement	160	SY	10	1,600
Buy, Haul, Place Clean fill	1835	CY	14.5	26,608
Buy, Haul, Place Topsoil	1345	CY	24	32,280
Place Sod	12100	SY	4	48,400
Transport to Main Industrial Property	3180	CY	8	25,440
Dust Control	55	DAY	770	42,350
Ambient Air Monitoring	19	DAY	1600	30,400
– REMOTE FILL IN ALLEYS, DRIVEWAYS				
Place Asphalt Pavement	23100	SY	10	231,000
Seed, Fertilize, Mulch	3860	SY	0.40	1,544
– ADDITIONAL COSTS ASSOCIATED W/ ON-SITE DISPOSAL (MAIN INDUSTRIAL PROPERTY)				
On-site Treatment (Stabilization)	1530	TON	65	99,450
Enlargement of Landfill				
– Buy, Haul, Place Topsoil	1180	CY	24	28,320
– Buy, Haul, Place 60 mil HDPE Liner	20000	SF	1.25	25,000
– Buy, Haul, Place Geotextile Fabric	9940	SF	0.22	2,187
– Buy, Haul, Place Gravel	370	CY	15	5,550
– Buy, Haul, Place PVC Collection Pipe	50	FT	2	100
– Buy, Haul, Place Clay (liner)	1110	CY	14	15,540
Grading, Contouring, Consolidation	3740	CY	1	3,740
SUBTOTAL				$643,792
Mobilization (10% of Subtotal)				$64,379
SUBTOTAL CONSTRUCTION COSTS				$708,171

TABLE 3-9
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA – REMOTE FILL AREAS – ALTERNATIVE RF-A1
ON-SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$106,226
–OTHER				
Administrative/Permitting (5% of Total)				$35,409
Surveying				$10,000
Safety Program				$5,000
Equipment Decontamination				$5,000
Engineering Design (10% of Total)				$70,817
Construction Services (10% of Total)				$70,817
SUBTOTAL				$303,269
TOTAL ESTIMATED CAPITAL COSTS				$1,011,440
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				6 – 8 months
ANNUAL OPERATING & MAINTENANCE COSTS				
Air Monitoring Labor	2	Day	275	550
Air Monitoring Sample Analysis	8	Ea	1010	8,080
Misc. Site Work	15	Day	275	4,125
Misc. Equipment & Supplies	LS	LS	4400	4,400
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$17,155

TABLE 3-10
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA – REMOTE FILL AREAS – ALTERNATIVE RF-A2
ON-SITE TREATMENT AND OFF-SITE DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– REMOTE FILL IN RESIDENTIAL AREAS				
Clear/Replace incidentals	12090	SY	0.51	$6.166
Manual Excavation	160	CY	58	9.280
Light Excavation	3020	CY	2.4	7.248
Load	3180	CY	0.50	1,590
Place Asphalt Pavement	160	SY	10	1,600
Buy, Haul, Place Clean fill	1835	CY	14.5	26,608
Buy, Haul, Place Topsoil	1345	CY	24	32,280
Place Sod	12100	SY	4	48,400
Transport to Off-site Landfill	3490	CY	8	27,920
On-site Treatment (Stabilization)	1530	TON	65	99,450
Disposal (Special Waste)	3490	CY	20	69,800
Dust Control	55	DAY	770	42,350
Ambient Air Monitoring	19	DAY	1600	30,400
– REMOTE FILL IN ALLEYS, DRIVEWAYS				
Place Asphalt Pavement	23100	SY	10	231,000
Seed, Fertilize, Mulch	3860	SY	0.4	1,544
SUBTOTAL				$635,635
Mobilization (10% of Subtotal)				$63,564
SUBTOTAL CONSTRUCTION COSTS				$699,199

TABLE 3-10
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA - REMOTE FILL AREAS - ALTERNATIVE RF-A2
ON-SITE TREATMENT AND OFF-SITE DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
-CONTINGENCY				
(15% of Subtotal)				$104,880
-OTHER				
Administrative/Permitting (5% of Total)				$34,960
Surveying				$10,000
Safety Program				$5,000
Equipment Decontamination				$5,000
Engineering Design (10% of Total)				$69,920
Construction Services (10% of Total)				$69,92[illegible]
SUBTOTAL				$299,68[illegible]
TOTAL ESTIMATED CAPITAL COSTS				$998,879
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				6 - 8 months
ANNUAL OPERATING & MAINTENANCE COSTS				
Air Monitoring Labor	2	Day	275	5[illegible]
Air Monitoring Sample Analysis	8	Ea	1010	8,080
Misc. Site Work	15	Day	275	4,125
Misc. Equipment & Supplies	LS	LS	4400	4,400
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$17,155

TABLE 3-11
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA - REMOTE FILL AREAS - ALTERNATIVE RF-A3
OFF-SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
- REMOTE FILL IN RESIDENTIAL AREAS				
Clear/Replace incidentals	12090	SY	0.51	$6,166
Manual Excavation	160	CY	58	9,280
Light Excavation	3020	CY	2.4	7,248
Load	3180	CY	0.50	1,590
Place Asphalt Pavement	160	SY	10	1,600
Buy, Haul, Place Clean fill	1835	CY	14.5	26,608
Buy, Haul, Place Topsoil	1345	CY	24	32,280
Place Sod	12100	SY	4	48,400
Transport to Off-site Landfill (Special)	2150	CY	8	17,200
Transport to Off-site Landfill (Hazardous)	52	LOAD	610	31,720
Disposal (Special Waste)	2150	CY	20	43,000
Treatment/Disposal (Hazardous)	1530	TON	115	175,950
Dust Control	55	DAY	770	42,350
Ambient Air Monitoring	19	DAY	1600	30,400
- REMOTE FILL IN ALLEYS, DRIVEWAYS				
Place Asphalt Pavement	23100	SY	10	231,000
Seed, Fertilize, Mulch	3860	SY	0.40	1,544
SUBTOTAL				$706,335
Mobilization (10% of Subtotal)				$70,634
SUBTOTAL CONSTRUCTION COSTS				$776,969

TABLE 3–11
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA – REMOTE FILL AREAS – ALTERNATIVE RF–A3
OFF–SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$116,545
–OTHER				
Administrative/Permitting (5% of Total)				$38,848
Surveying				$10,000
Safety Program				$5,000
Equipment Decontamination				$5,000
Engineering Design (10% of Total)				$77,697
Construction Services (10% of Total)				$77,697
SUBTOTAL				$330,788
TOTAL ESTIMATED CAPITAL COSTS				$1,107,757
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				6 – 8 months
ANNUAL OPERATING & MAINTENANCE COSTS				
Air Monitoring Labor	2	Day	275	55
Air Monitoring Sample Analysis	8	Ea	1010	8,080
Misc. Site Work	15	Day	275	4,125
Misc. Equipment & Supplies	LS	LS	4400	4,400
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$17,155

TABLE 3-12
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA – REMOTE FILL AREAS – ALTERNATIVE RF-B1
ON-SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– REMOTE FILL IN RESIDENTIAL AREAS				
Clear/Replace incidentals	12090	SY	0.51	$6,166
Manual Excavation	160	CY	58	9,280
Light Excavation	3020	CY	2.4	7,248
Load	3180	CY	0.50	1,590
Place Asphalt Pavement	160	SY	10	1,600
Buy, Haul, Place Clean fill	1835	CY	14.5	26,608
Buy, Haul, Place Topsoil	1345	CY	24	32,280
Place Sod	12100	SY	4	48,400
Transport to Main Industrial Property	3180	CY	8	25,440
Dust Control	55	DAY	770	42,350
Ambient Air Monitoring	19	DAY	1600	30,400
– REMOTE FILL IN ALLEYS, DRIVEWAYS				
Clear/Replace incidentals	5780	SY	0.51	2,948
Medium Equipment Excavation	10510	CY	1.83	19,233
Load	10510	CY	0.40	4,204
Transport to Main Industrial Property	10510	CY	8	84,080
Buy, Haul, Place Clean fill	5050	CY	14.5	73,225
Dust Control	53	DAY	770	40,810
Ambient Air Monitoring	11	DAY	1600	17,600
Place Asphalt Pavement	23100	SY	10	231,000
Seed, Fertilize, Mulch	3860	SY	0.40	1,544
– ADDITIONAL COSTS ASSOCIATED W/ ON-SITE DISPOSAL (MAIN INDUSTRIAL PROPERTY)				
On-site Treatment (Stabilization)	5960	TON	65	387,400
Enlargement of Landfill				
– Buy, Haul, Place Topsoil	2960	CY	24	71,040
– Buy, Haul, Place 60 mil HDPE Liner	50000	SF	1.25	62,500
– Buy, Haul, Place Geotextile Fabric	24900	SF	0.22	5,478
– Buy, Haul, Place Gravel	920	CY	15	13,800
– Buy, Haul, Place PVC Collection Pipe	140	FT	2	280
– Buy, Haul, Place Clay (liner)	2760	CY	14	38,640
Grading, Contouring, Consolidation	11406	CY	1	11,406
SUBTOTAL				$1,296,550
Mobilization (10% of Subtotal)				$129,655
SUBTOTAL CONSTRUCTION COSTS				$1,426,204

TABLE 3-12
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA – REMOTE FILL AREAS – ALTERNATIVE RF-B1
ON-SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$213,931
–OTHER				
Administrative/Permitting (5% of Total)				$71,310
Surveying				$10,000
Safety Program				$5,000
Equipment Decontamination				$10,000
Engineering Design (10% of Total)				$142,620
Construction Services (10% of Total)				$142,62[illegible]
SUBTOTAL				$595,48[illegible]
TOTAL ESTIMATED CAPITAL COSTS				$2,021,686
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				9 – 12 months
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-13
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA - REMOTE FILL AREAS - ALTERNATIVE RF-B2
ON-SITE TREATMENT AND OFF-SITE DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
- REMOTE FILL IN RESIDENTIAL AREAS				
Clear/Replace incidentals	12090	SY	0.51	$6.166
Manual Excavation	160	CY	58	9.280
Light Excavation	3020	CY	2.4	7,248
Load	3180	CY	0.50	1,590
Place Asphalt Pavement	160	SY	10	1,600
Buy, Haul, Place Clean fill	1835	CY	14.5	26,608
Buy, Haul, Place Topsoil	1345	CY	24	32,280
Place Sod	12100	SY	4	48,400
On-site Treatment (Stabilization)	1530	TON	65	99,450
Disposal (Special Waste)	3490	CY	20	69,800
Transport to Off-site Landfill	3490	CY	8	27,920
Dust Control	55	DAY	770	42,350
Ambient Air Monitoring	19	DAY	1600	30,400
- REMOTE FILL IN ALLEYS, DRIVEWAYS				
Clear/Replace incidentals	5780	SY	0.51	2,948
Medium Equipment Excavation	10510	CY	1.83	19,233
Load	10510	CY	0.40	4,204
On-site Treatment (Stabilization)	4430	TON	65	287,950
Disposal (Special Waste)	11410	CY	20	228,200
Transport to Off-site Landfill	11410	CY	8	91,280
Buy, Haul, Place Clean fill	5050	CY	14.5	73,225
Dust Control	53	DAY	770	40,810
Ambient Air Monitoring	11	DAY	1600	17,600
Place Asphalt Pavement	23100	SY	10	231,000
Seed, Fertilize, Mulch	3860	SY	0.40	1,544
SUBTOTAL				$1,401,086
Mobilization (10% of Subtotal)				$140,109
SUBTOTAL CONSTRUCTION COSTS				$1,541,194

TABLE 3-13
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA – REMOTE FILL AREAS – ALTERNATIVE RF-B2
ON-SITE TREATMENT AND OFF-SITE DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$231,179
–OTHER				
Administrative/Permitting (5% of Total)				$77,060
Surveying				$10,000
Safety Program				$5,000
Equipment Decontamination				$10,000
Engineering Design (10% of Total)				$154,119
Construction Services (10% of Total)				$154,119
SUBTOTAL				$641,478
TOTAL ESTIMATED CAPITAL COSTS				$2,182,672
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				9 – 12 months
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-14
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA - REMOTE FILL AREAS - ALTERNATIVE RF-B3
OFF-SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
- REMOTE FILL IN RESIDENTIAL AREAS				
Clear/Replace incidentals	12090	SY	0.51	$6,166
Manual Excavation	160	CY	58	9,280
Light Excavation	3020	CY	2.4	7,248
Load	3180	CY	0.50	1,590
Place Asphalt Pavement	160	SY	10	1,600
Buy, Haul, Place Clean fill	1835	CY	14.5	26,608
Buy, Haul, Place Topsoil	1345	CY	24	32,280
Place Sod	12100	SY	4	48,400
Transport to Off-site Landfill (Special)	2150	CY	8	17,200
Disposal (Special Waste)	2150	CY	20	43,000
Transport to Off-site Landfill (Hazardous)	52	LOAD	610	31,720
Treatment/Disposal (Hazardous)	1530	TON	115	175,950
Dust Control	55	DAY	770	42,350
Ambient Air Monitoring	19	DAY	1600	30,400
- REMOTE FILL IN ALLEYS, DRIVEWAYS				
Clear/Replace incidentals	5780	SY	0.51	2,948
Medium Equipment Excavation	10510	CY	1.83	19,233
Load	10510	CY	0.40	4,204
Treatment/Disposal (Hazardous)	4430	TON	115	509,450
Transport to Off-site Landfill (Hazardous)	150	LOAD	610	91,500
Disposal (Special Waste)	7525	CY	20	150,500
Transport to Off-site Landfill (Special)	7525	CY	8	60,200
Buy, Haul, Place Clean fill	5050	CY	14.5	73,225
Dust Control	53	DAY	770	40,810
Ambient Air Monitoring	11	DAY	1600	17,600
Place Asphalt Pavement	23100	SY	10	231,000
Seed, Fertilize, Mulch	3860	SY	0.40	1,544
SUBTOTAL				$1,676,006
Mobilization (10% of Subtotal)				$167,601
SUBTOTAL CONSTRUCTION COSTS				$1,843,606

TABLE 3-14
PRELIMINARY COST AND TIME ESTIMATES
SOLID MEDIA - REMOTE FILL AREAS - ALTERNATIVE RF-B3
OFF-SITE TREATMENT AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
INDIRECT CAPITAL COSTS				
-CONTINGENCY				
(15% of Subtotal)				$276,541
-OTHER				
Administrative/Permitting (5% of Total)				$92,180
Surveying				$10,000
Safety Program				$5,000
Equipment Decontamination				$10,000
Engineering Design (10% of Total)				$184,361
Construction Services (10% of Total)				$184,36[illegible]
SUBTOTAL				$762,4[illegible]
TOTAL ESTIMATED CAPITAL COSTS				$2,606,048
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				9 - 12 months
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-15
PRELIMINARY COST AND TIME ESTIMATES
GROUNDWATER MEDIA - ALTERNATIVE G-A
Monitoring and Natural Attentuation

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
- MAIN INDUSTRIAL AREA				
Install and Develop Monitoring Wells	3	EACH	2600	$7,800
- REMOTE FILL AREAS				
Install and Develop Monitoring Wells	10	EACH	2600	26,000
SUBTOTAL				$33,800
Mobilization (10% of subtotal)				$3,380
SUBTOTAL CONSTRUCTION COSTS				$37,180
INDIRECT CAPITAL COSTS				
- CONTINGENCY				
(15% of Subtotal)				$5,577
- OTHER				
Administrative/Permitting (5% of Total)				$1,859
Surveying				$1,500
Engineering Design (10% of Total)				$3,718
Construction Services (10% of Total)				$3,718
SUBTOTAL				$16,372
TOTAL ESTIMATED CAPITAL COSTS				$53,552
ESTIMATED TIME TO CONSTRUCT (excludes design, bid, and admin.)				20 to 30 days
ANNUAL OPERATING & MAINTENANCE COSTS				
Groundwater Sampling Labor	13	Day	1000	13,000
Groundwater Sample Analysis	145	EACH	200	29,000
Misc. Equipment & Supplies	LS	LS	1000	800
Annual Monitoring Report	LS	LS	15000	15,000
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$57,800

TABLE 3-16

PRELIMINARY COST AND TIME ESTIMATES

GROUNDWATER MEDIA – ALTERNATIVE G-B

Main Industrial Area – Pump & Dispose to local POTW

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– MAIN INDUSTRIAL AREA PUMP & TREAT				
Recovery Well Construction	1	LS	100,000	$100,000
Pump/Plumbing/Electrical wiring	1	LS	165,000	165,000
System Start-up	1	LS	10,000	10,000
– REMOTE FILL AREAS				
Install and Develop Monitoring Wells	10	EACH	2600	26,000
SUBTOTAL				$301,0
Mobilization (10% of subtotal)				$30,100
SUBTOTAL CONSTRUCTION COSTS				$331,100
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$49,665
–OTHER				
Administrative/Permitting (5% of Total)				$16,555
Surveying				$2,500
Engineering Design (10% of Total)				$33,110
Construction Services (10% of Total)				$33,1
SUBTOTAL				$134,940
TOTAL ESTIMATED CAPITAL COSTS				$466,040
ESTIMATED TIME TO CONSTRUCT (excludes desing, bid, and admin.)				2 to 4 months

TABLE 3-16

PRELIMINARY COST AND TIME ESTIMATES

GROUNDWATER MEDIA - ALTERNATIVE G-B

Main Industrial Area - Pump & Dispose to local POTW

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
ANNUAL OPERATING & MAINTENANCE COSTS				
Groundwater Sampling Labor	13	Day	1000	13,000
Groundwater Sample Analysis	145	Ea	200	29,000
Misc. Equipment & Supplies	LS	LS	1000	800
Annual Monitoring Report	LS	LS	15000	15,000
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$57,800
GROUNDWATER PUMP & TREAT OPERATION & MAINTENANCE COSTS				
Year 1	1	LS	100000	1,00,000
Year 2	1	LS	75000	75,000
Year 3-30	28	YR	40000	1,120,000
Groundwater Disposal to POTW	30	YR	67000	2,010,000
ESTIMATED PUMP & TREAT O & M COSTS				$3,305,000

TABLE 3-17
PRELIMINARY COST AND TIME ESTIMATES
GROUNDWATER MEDIA – ALTERNATIVE G-C
MAIN INDUSTRIAL AREA – SLURRY WALL W/ PUMP AND DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– MAIN INDUSTRIAL AREA				
Extraction Well Installation	1	LS	50,000	$50,000
Slurry Wall	500000	SF	20	10,000,000
Asphalt Cap	125000	SY	5.8	725,000
– REMOTE FILL AREAS				
Install and Develop Monitoring Wells	10	EACH	2600	26,000
SUBTOTAL				$10,801,0[illegible]
Mobilization (10% of subtotal)				$1,080,100
SUBTOTAL CONSTRUCTION COSTS				$11,881,100
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$1,782,16[illegible]
–OTHER				
Administrative/Permitting (5% of Total)				$594,055
Surveying				$3,000
Engineering Design (10% of Total)				$1,188,110
Construction Services (10% of Total)				$1,188,1
SUBTOTAL				$4,755,44[illegible]
TOTAL ESTIMATED CAPITAL COSTS				$16,636,540
ESTIMATED TIME TO CONSTRUCT (excludes design, bid, and admin.)				6 to 8 months
ANNUAL OPERATING & MAINTENANCE COSTS				
Groundwater Sampling Labor	13	Day	1000	13,000
Groundwater Sample Analysis	145	Ea	200	29,000
Misc. Equipment & Supplies	LS	LS	1000	800
Annual Monitoring Report	LS	LS	15,000	15,000
Extraction Well Operating & Maintenance	LS	LS	40,000	40,000
ESTIMATED ANNUAL OPERATING & MAINTENANCE COSTS				$97,800

TABLE 3-18
PRELIMINARY COST AND TIME ESTIMATES
SOIL MEDIA – ADJACENT RESIDENTIAL AREA – ROD (ALTERNATIVE H)
DISPOSAL ON THE MAIN INDUSTRIAL PROPERTY

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– UNPAVED ADJACENT RESIDENTIAL AREAS				
Clear/Replace incidentals	617000	SY	0.51	$314,670
Manual Excavation	4650	CY	58	269,700
Light Excavation	88250	CY	2.4	211,800
Load	92900	CY	0.40	37,160
Transport to Main Industrial Property	92900	CY	8	743,200
Buy, Haul, Place Clean Fill	41500	CY	14.5	601,750
Buy, Haul, Place Topsoil	51400	CY	24	1,233,600
Place Sod	617000	SY	4	2,468,000
Dust Control	1740	DAY	770	1,339,800
Ambient Air Monitoring	130	DAY	1600	208,000
– ADDITIONAL COSTS ASSOCIATED W/ ON-SITE DISPOSAL (MAIN INDUSTRIAL PROPERTY)				
Grading, Contouring, Consolidation	92900	CY	1	92,900
Enlargement of Landfill				
– Buy, Haul, Place Topsoil	18910	CY	24	453,840
– Buy, Haul, Place 60 mil HDPE Liner	320000	SF	1.25	400,000
– Buy, Haul, Place Geotextile Fabric	159000	SF	0.22	34,980
– Buy, Haul, Place Gravel	5890	CY	15	88,350
– Buy, Haul, Place PVC Collection Pipe	870	FT	2	1,740
– Buy, Haul, Place Clay (liner)	17700	CY	14	247,800
SUBTOTAL				$8,747,290
Mobilization (10% of subtotals)				$874,729
SUBTOTAL CONSTRUCTION COSTS				$9,622,019
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$1,443,303
–OTHER				
Administrative/Permitting (5% of Total)				$481,101
Surveying				$20,000
Safety Program				$35,000
Equipment Decontamination				$50,000
Engineering Design (10% of Total)				$962,202
Construction Services (10% of Total)				$962,202
SUBTOTAL				$3,953,808
TOTAL ESTIMATED CAPITAL COSTS				$13,575,827
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				3 to 4 years
ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-19
PRELIMINARY COST AND TIME ESTIMATES
SOIL MEDIA – ADJACENT RESIDENTIAL AREA – ROD (ALTERNATIVE H)
DISPOSAL TO OFF-SITE SPECIAL WASTE LANDFILL

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
– UNPAVED ADJACENT RESIDENTIAL AREAS				
Clear/Replace incidentals	617000	SY	0.51	$314,670
Manual Excavation	4650	CY	58	269,700
Light Excavation	88250	CY	2.4	211,800
Load	92900	CY	0.40	37,160
Transport to Landfill	92900	CY	8	743,200
Buy, Haul, Place Clean Fill	41500	CY	14.5	601,750
Buy, Haul, Place Topsoil	51400	CY	24	1,233,600
Place Sod	617000	SY	4	2,468,0[illegible]
Disposal	92900	CY	20	1,858,0[illegible]
Dust Control	1740	DAY	770	1,339,800
Ambient Air Monitoring	130	DAY	1600	208,000
SUBTOTAL				$9,285,680
Mobilization (10% of subtotals)				$1,392,852
SUBTOTAL CONSTRUCTION COSTS				$10,678,5[illegible]
INDIRECT CAPITAL COSTS				
–CONTINGENCY				
(15% of Subtotal)				$1,601,780
–OTHER				
Administrative/Permitting (5% of Total)				$533,927
Surveying				$20,000
Safety Program				$35,000
Equipment Decontamination				$50,000
Engineering Design (10% of Total)				$1,067,853
Construction Services (10% of Total)				$1,067,853
SUBTOTAL				$4,376,413
TOTAL ESTIMATED CAPITAL COSTS				$15,054,945
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				3 to 4 years
ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 3-20
PRELIMINARY COST AND TIME ESTIMATES
DRUM DISPOSAL - MAIN INDUSTRIAL AREA - ROD (ALTERNATIVE H)

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
DIRECT CAPITAL COSTS				
- DRUMS ON TARACORP PROPERTY				
Loading (equipment & crew)	1	LS	800	$800
Transportation	1	LOAD	930	930
Secondary Smelter	35	TON	175	6.125
SUBTOTAL				$7.855
Mobilization (10% of loading and transportation)				$173
SUBTOTAL CONSTRUCTION COSTS				$8,028
INDIRECT CAPITAL COSTS				
-CONTINGENCY				
(15% of Subtotal)				$1,204
-OTHER				
Administrative/Permitting (5% of Total)				$401
Engineering Design (10% of Total)				$803
Construction Services (10% of Total)				$803
SUBTOTAL				$3,211
TOTAL ESTIMATED CAPITAL COSTS				$11,239
ESTIMATED TIME TO REMEDIATE (excludes design, bid, and admin.)				2 to 3 weeks
ANNUAL OPERATING & MAINTENANCE COSTS				$0

TABLE 4-1: EVALUATION AND COMPARISON OF ALTERNATIVES
SOLID MEDIA - MAIN INDUSTRIAL AREA
NL/TARACORP SUPERFUND SITE

ASSESSMENT FACTORS	ALTERNATIVE M-A SOURCE REMOVAL TO ONSITE LANDFILL; NO TREATMENT	ALTERNATIVE M-B SOURCE REMOVAL TO ONSITE LANDFILL; ONSITE TREATMENT	ALTERNATIVE M-C1 SOURCE REMOVAL TO OFFSITE LANDFILL; OFFSITE TREATMENT	ALTERNATIVE M-C2 SOURCE REMOVAL TO OFFSITE LANDFILL; ONSITE TREATMENT	ALTERNATIVE M-D SOURCE REMOVAL, ONSITE SORTING OFFSITE RECYCLING, DISPOSAL
IMPLEMENTABILITY: TECHNICAL FEASIBILITY	Only Standard Construction Techniques and Monitoring Required	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Uses Standard Construction Techniques & Monitoring; Recycling & Treatment Technologies Available; Limited Applications
ADMINISTRATIVE FEASIBILITY	Coordination With Local, State, Federal Government Required	Coordination With Local, State, Federal Government Required	Coordination With Local Government Required to Remediate Affected Areas IEPA Permits, Manifests Required for Transportation, Disposal	Coordination With Local Government Required to Remediate Affected Areas IEPA Permits, Manifests Required for Transportation, Disposal	Coordination With Local Government Required to Remediate Affected Areas IEPA Permits, Manifests Required for Transportation, Disposal
AVAILABILITY OF SERVICES AND MATERIALS	Services and Materials Locally Available	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Contractors Readily Available for Excavation, Restoration; Limited Number of Contractors Offer Recycling
COST: CAPITAL COST	$4,510,000	$28,700,000	$64,800,000	$34,600,000	$87,400,000
ANNUAL O & M	$18,700	$20,100	$0	$0	$0
PRESENT WORTH (i=5%, 30 yrs)	$4,800,000	$29,000,000	$64,800,000	$34,600,000	$87,400,000
OVERALL PROTECTION OF HUMAN HEALTH & THE ENVIRONMENT: HOW ARE RISKS ELIMINATED	Consolidating Contaminated Material at Main Industrial Site Reduces Eliminates Exposure Risk	Consolidating and Treating Contaminated Material Eliminates Exposure Risk for Soils on the Main Industrial Site	Source Removal to Offsite Treatment & Disposal Facility Eliminates Exposure Risk for Soils on the Main Industrial Site	Source Removal to Offsite Treatment & Disposal Facility Eliminates Exposure Risk for Soils on the Main Industrial Site	Source Removal Eliminates Exposure Risk for Soil for Entire Site, Onsite Sorting & Treatment Allows Material to be Recycled & Will Minimize Use of Landfill Space
COMPLIANCE WITH ARARs:	ARARs for Solid Media Will be Met;	ARARs for Solid Media Will be Met;	ARARs for Solid Media Will be Met;	ARARs for Solid Media Will be Met;	ARARs for Solid Media Will be Met;
LONG TERM EFFECTIVENESS MAGNITUDE OF RESIDUAL RISK	Long Term Effectiveness at Main Industrial Site is Dependent on Continuing Maintenance & Monitoring	Long Term Effectiveness at Main Industrial Site is Excellent, but Will Require Continuing Maintainance & Monitoring	Source Removal Effectively Eliminates Residual Risk for Direct Contact with Contaminated Soil	Source Removal Effectively Eliminates Residual Risk for Direct Contact with Contaminated Soil	Source Removal Effectively Eliminates Residual Risk for Direct Contact with Contaminated Soil
ADEQUACY OF CONTROLS	Consolidation and Capping is an Effective Method of Reducing the Risk of Direct Exposure	Treatment, Consolidation and Capping is a Very Effective Method of Reducing the Risk of Direct Exposure	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure
RELIABILITY OF CONTROLS	Long Term Maintenance and Monitoring is required to Insure the Integrity of the Cap	Long Term Maintenance and Monitoring is required to Insure the Integrity of the Cap	Permanent Solution to Soil Contamination	Permanent Solution to Soil Contamination	Permanent Solution to Soil Contamination
REDUCTION OF TOXICITY, MOBILITY, VOLUME:	Cap Over Pile Greatly Reduces Mobility of Contamination; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; Waste Volume Reduced by Recycling
SHORT TERM EFFECTIVENESS: TIMEFRAME TO IMPLEMENT PROTECTIVE MEASURES	1 to 3 Years	2 to 4 Years	2 to 4 years	2 to 4 years	2 to 4 years
PROTECTION OF COMMUNITY DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls
PROTECTION OF WORKERS DURING IMPLEMENTATION	*Dust Generated by Excavation* Will Require Monitoring and Controls	*Dust Generated by Excavation* Will Require Monitoring and Controls	*Dust Generated by Excavation* Will Require Monitoring and Controls	*Dust Generated by Excavation* Will Require Monitoring and Controls	*Dust Generated by Excavation* Will Require Monitoring and Controls
PROTECTION OF ENVIRONMENT DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls

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TABLE 4-2: EVALUATION AND COMPARISON OF ALTERNATIVES
SOLID MEDIA - REMOTE FILL AREAS
NL/TARACORP SUPERFUND SITE

ASSESSMENT FACTORS	ALTERNATIVE RF-A		
	REMOVAL OF RESIDENTIAL REMOTE FILL ONSITE DISPOSAL WITH ONSITE TREATMENT CAP ALLEYS AND DRIVES WITH ASPHALT	REMOVAL OF RESIDENTIAL REMOTE FILL OFFSITE DISPOSAL WITH ONSITE TREATMENT CAP ALLEYS AND DRIVES WITH ASPHALT	REMOVAL OF RESIDENTIAL REMOTE FILL OFFSITE DISPOSAL WITH OFFSITE TREATMENT CAP ALLEYS AND DRIVES WITH ASPHALT
IMPLEMENTABILITY: TECHNICAL FEASIBILITY	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available
ADMINISTRATIVE FEASIBILITY	Coordination With Residents, Local, State, Federal Government, Required to Remediate Residential and Remote Fill Areas	Coordination With Residents, Local, State, Federal Government, Required to Remediate Residential and Remote Fill Areas	Coordination With Residents, Local, State, Federal Government, Required to Remediate Residential and Remote Fill Areas
AVAILABILITY OF SERVICES AND MATERIALS	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material
COST: CAPITAL COST	$1,010,000	$999,000	$1,110,000
ANNUAL O & M	$17,200	$17,200	$17,200
PRESENT WORTH (i=5%, 30 yrs)	$1,270,000	$1,260,000	$1,370,000
OVERALL PROTECTION OF HUMAN HEALTH & THE ENVIRONMENT: HOW ARE RISKS ELIMINATED	Consolidating and Treating Contaminated Material Onsite Eliminates Exposure Risk for Soils over the Entire Site	Removal of Contaminated Material from Site Eliminates Exposure Risk for Soils over the Entire Site	Removal of Contaminated Material from Site Eliminates Exposure Risk for Soils over the Entire Site
COMPLIANCE WITH ARARs:	ARARs for Solid Media Will be Met;	ARARs for Solid Media Will be Met;	ARARs for Solid Media Will be Met;
LONG TERM EFFECTIVENESS MAGNITUDE OF RESIDUAL RISK	Residual Risk is eliminated at Remote Fill Areas; Long Term Effectiveness at Main Industrial Site is Excellent, but Will Require Continuing Maintenance and Monitoring	Residual Risk is eliminated at Remote Fill and Residential Areas; Long Term Effectiveness at Main Industrial Site is Excellent	Residual Risk is eliminated at Remote Fill and Residential Areas; Long Term Effectiveness at Main Industrial Site is Excellent
ADEQUACY OF CONTROLS	Treatment, Consolidation and Capping is a Very Effective Method of Reducing the Risk of Direct Exposure	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure
RELIABILITY OF CONTROLS	Long Term Maintenance and Monitoring is required to Insure the Integrity of the Caps	Long Term Maintenance and Monitoring is required to Insure the Integrity of the Caps	Long Term Maintenance and Monitoring is required to Insure the Integrity of the Caps
REDUCTION OF TOXICITY, MOBILITY, VOLUME:	Toxicity and Mobility Effectively Eliminated at Remote Fill Areas; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; No Volume Reduction
SHORT TERM EFFECTIVENESS: TIMEFRAME TO IMPLEMENT PROTECTIVE MEASURES	6 to 8 Months	6 to 8 Months	6 to 8 Months
PROTECTION OF COMMUNITY DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls
PROTECTION OF WORKERS DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls
PROTECTION OF ENVIRONMENT DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls

TABLE 4-2: EVALUATION AND COMPARISON OF ALTERNATIVES
SOLID MEDIA - REMOTE FILL AREAS
NL/TARACORP SUPERFUND SITE

ASSESSMENT FACTORS	ALTERNATIVE RF-B REMOVAL OF ALL REMOTE FILL ONSITE DISPOSAL WITH ONSITE TREATMENT	ALTERNATIVE RF-B REMOVAL OF ALL REMOTE FILL OFFSITE DISPOSAL WITH ONSITE TREATMENT	ALTERNATIVE RF-B REMOVAL OF ALL REMOTE FILL OFFSITE DISPOSAL WITH OFFSITE TREATMENT
IMPLEMENTABILITY: TECHNICAL FEASIBILITY	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available
ADMINISTRATIVE FEASIBILITY	Coordination With Residents, Local Government Required to Remediate Affected Areas; IEPA Permits, Manifests Required for Transportation, Disposal	Coordination With Residents, Local Government Required to Remediate Affected Areas; IEPA Permits, Manifests Required for Transportation, Disposal	Coordination With Residents, Local Government Required to Remediate Affected Areas; IEPA Permits, Manifests Required for Transportation, Disposal
AVAILABILITY OF SERVICES AND MATERIALS	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material
COST: CAPITAL COST	$2,020,000	$2,180,000	$2,610,000
ANNUAL O & M	$0	$0	$0
PRESENT WORTH (i=5%, 30 yrs)	$2,020,000	$2,180,000	$2,610,000
OVERALL PROTECTION OF HUMAN HEALTH & THE ENVIRONMENT: HOW ARE RISKS ELIMINATED	Source Removal for Onsite Treatment & Disposal Eliminates Exposure Risk for Soil for the Entire Site	Source Removal for Onsite Treatment & Offsite Disposal Eliminates Exposure Risk for Soil for the Entire Site	Source Removal for Onsite Treatment & Offsite Disposal Eliminates Exposure Risk for Soil for the Entire Site
COMPLIANCE WITH ARARs:	*ARARs for Solid Media Will be Met;*	*ARARs for Solid Media Will be Met;*	*ARARs for Solid Media Will be Met;*
LONG TERM EFFECTIVENESS MAGNITUDE OF RESIDUAL RISK	Source Removal Effectively Eliminates Residual Risk for Direct Contact with Contaminated Soil for the Entire Site	Source Removal Effectively Eliminates Residual Risk for Direct Contact with Contaminated Soil for the Entire Site	Source Removal Effectively Eliminates Residual Risk for Direct Contact with Contaminated Soil for the Entire Site
ADEQUACY OF CONTROLS	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure	Source Removal and Elimination of Onsite Contamination is a Very Effective Method of Reducing the Risk of Direct Exposure
RELIABILITY OF CONTROLS	Permanent Solution to Soil Contamination	Permanent Solution to Soil Contamination	Permanent Solution to Soil Contamination
REDUCTION OF TOXICITY, MOBILITY, VOLUME:	Toxicity and Mobility Effectively Eliminated; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; No Volume Reduction	Toxicity and Mobility Effectively Eliminated; No Volume Reduction
SHORT TERM EFFECTIVENESS: TIMEFRAME TO IMPLEMENT PROTECTIVE MEASURES	9 to 12 Months	9 to 12 Months	9 to 12 Months
PROTECTION OF COMMUNITY DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls
PROTECTION OF WORKERS DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls
PROTECTION OF ENVIRONMENT DURING IMPLEMENTATION	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls	Dust Generated by Excavation Will Require Monitoring and Controls

TABLE 4-3
EVALUATION AND COMPARISON OF ALTERNATIVES
GROUNDWATER
NL/TARACORP SUPERFUND SITE

ASSESSMENT FACTORS	ALTERNATIVE G-A MONITORING AND NATURAL ATTENUATION	ALTERNATIVE G-B GROUNDWATER CONTAINMENT ON THE MAIN INDUSTRIAL SITE BY PUMPING & DISPOSAL INTO THE LOCAL POTW; ALTERNATIVE G FOR OTHER AREAS	ALTERNATIVE G-C GROUNDWATER CONTAINMENT ON THE MAIN INDUSTRIAL SITE BY SLURRY WALL & PUMPING DISPOSAL INTO LOCAL POTW ALTERNATIVE G FOR OTHER AREAS
IMPLEMENTABILITY: TECHNICAL FEASIBILITY	Only Standard Construction Techniques and Monitoring Required	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available	Standard Construction Techniques and Monitoring Required Treatment Technology Readily Available
ADMINISTRATIVE FEASIBILITY	Construction Limited to New Monitoring Wells, Onsite Fencing; No Administrative Difficulties Anticipated	Coordination With Residents, POTW, Local Government Required	Coordination With Residents, POTW, Local Government Required
AVAILABILITY OF SERVICES AND MATERIALS	Services and Materials Locally Available	Most Services and Materials Locally Available; Limited Number of Contractors for Treatment of Hazardous Material	Most Services and Materials Locally Available Limited Number of Contractors for Treatment of Hazardous Material
COST: CAPITAL COST	$53,600	$466,000	$16,600,000
ANNUAL O & M	$57,800	$165,000	$97,800
PRESENT WORTH (i=5%, 30 yrs)	$940,000	$2,990,000	$18,100,000
OVERALL PROTECTION OF HUMAN HEALTH & THE ENVIRONMENT: HOW ARE RISKS ELIMINATED	Institutional Controls Limit Risk of Direct Contact at Main Industrial Site; No Risk Reduction for Eagle Park Acres, Venice, Adjacent Residential Areas	Onsite Cone of Depression Will Eliminate Potential Offsite Groundwater Exposure	Slurry Wall, Cone of Depression Will Eliminate Potential Offsite Groundwater Exposure
COMPLIANCE WITH ARARs:	Does not Address Groundwater ARARs	ARARs Will be Met	ARARs Will be Met
LONG TERM EFFECTIVENESS MAGNITUDE OF RESIDUAL RISK	Minimal Reduction in Residual Risk for Main Industrial Site due to Institutional Controls; No Reduction in Residual Risk for Other Areas	Groundwater Withdrawal Will Enhance Natural Attenuation Process and Reduce The Residual Risk More Quickly; No Risk Reduction for Other Areas	Groundwater Withdrawal Will Enhance Natural Attenuation Process and Reduce The Residual Risk More Quickly; No Risk Reduction for Other Areas
ADEQUACY OF CONTROLS	No Controls in Venice, Eagle Park Acres Adjacent Residential Areas, or Most Remote Fill Areas	Groundwater Contamination Will be Contained while Pumping is Continued	Groundwater Contamination Will be Contained while Pumping is Continued
RELIABILITY OF CONTROLS	Fencing will Require Ongoing Maintainance Migration of Groundwater Contamination will Continue	Long Term Pumping Will be Required to Effectively Contain Groundwater Contamination Onsite	Long Term Pumping Will be Required to Effectively Contain Groundwater Contamination Onsite
REDUCTION OF TOXICITY, MOBILITY, VOLUME:	No Reduction in Toxicity, Mobility, or Volume	Mobility & Toxicity of Groundwater Contaminants Reduced Over Time by Natural Attentuation	Mobility & Toxicity of Groundwater Contaminants Reduced Over Time by Natural Attentuation
SHORT TERM EFFECTIVENESS: TIMEFRAME TO IMPLEMENT PROTECTIVE MEASURES	6 to 12 Months	2 to 4 years	2 to 4 years
PROTECTION OF COMMUNITY DURING IMPLEMENTATION	No Short Term Impact	Containment Dikes May be Needed to Prevent Groundwater Release	Containment Dikes May be Needed to Prevent Groundwater Release
PROTECTION OF WORKERS DURING IMPLEMENTATION	No Short Term Impact	Containment Dikes May be Needed to Prevent Groundwater Release	Containment Dikes May be Needed to Prevent Groundwater Release
PROTECTION OF ENVIRONMENT DURING IMPLEMENTATION	No Short Term Impact	Containment Dikes May be Needed to Prevent Groundwater Release	Containment Dikes May be Needed to Prevent Groundwater Release

TABLE 4-4
PRESENT WORTH ANALYSIS
NL/TARACORP SUPERFUND SITE

Alternative	Capital Costs Year 0	Annual O & M Costs	Present Worth of Costs Over 30 years 3%	5%	10%
Solid Media – Main Industrial Area					
M-A: Source Removal to On-site Landfill	$4,510,000	$18,700	$4,880,000	$4,800,000	$4,690,000
M-B: On-site Treatment & Disposal	$28,700,000	$20,100	$29,100,000	$29,000,000	$28,900,000
M-C1: Off-site Treatment and Disposal	$64,800,000	$0	$64,800,000	$64,800,000	$64,800,000
M-C2: On-site Treament & Off-site Disposal	$34,600,000	$0	$34,600,000	$34,600,000	$34,600,000
M-D: On-site Sorting, Treatment; Off-site Recycling	$87,400,000	$0	$87,000,000	$87,400,000	$87,400,000
Solid Media – Remote Fill Areas					
RF-A: On-site Treatment and Disposal	$1,010,000	$17,200	$1,350,000	$1,270,000	$1,170,000
RF-A: On-site Treatment & Off-site Disposal	$999,000	$17,200	$1,340,000	$1,260,000	$1,160,000
RF-A: Off-site Treatment and Disposal	$1,110,000	$17,200	$1,450,000	$1,370,000	$1,270,000
RF-B: On-site Treatment and Disposal	$2,020,000	$0	$2,020,000	$2,020,000	$2,020,000
RF-B: On-site Treatment & Off-site Disposal	$2,180,000	$0	$2,180,000	$2,180,000	$2,180,000
RF-B: Off-site Treatment and Disposal	$2,610,000	$0	$2,610,000	$2,610,000	$2,610,000
Groundwater Media					
G-A: Monitoring and Natural Attentuation	$53,600	$57,800	$1,190,000	$940,000	$598,000
G-B: Pump & Dispose to local POTW	$466,000	$165,000*	$3,710,000	$2,990,000	$1,990,000
G-C: Slurry Wall with Pump & Disposal to local POTW	$16,600,000	$97,800	$18,500,000	$18,100,000	$17,500,000
Solid Media – Adjacent Residential Areas					
Remediation with On-site Disposal	$13,600,000	$0	$13,600,000	$13,600,000	$13,600,000
Remediation with Off-site Disposal	$15,100,000	$0	$15,100,000	$15,100,000	$15,100,000
Drum Disposal	$11,200	$0	$11,200	$11,200	$11,200

* – The annual costs for the first two years for the Groundwater Media Alternative B will be $225,000 and $200,000, respectively.

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TABLE 4-5
COSTS FOR MEDIA SPECIFIC REMEDIAL OPTIONS
NL/TARACORP SUPERFUND SITE

SOLID MEDIA REMOTE FILL AREAS	SOLID MEDIA MAIN INDUSTRIAL AREA	GROUNDWATER MEDIA	REMEDIAL COSTS NOT ADDRESSED IN THE SECOND ADDENDUM	REMEDIAL COSTS NOT ADDRESSED IN THE SECOND ADDENDUM	REMEDIAL COSTS NOT ADDRESSED IN THE SECOND ADDENDUM
RF-A: ON-SITE TREATMENT, DISPOSAL (1) CAPITAL COST: $1,010,000 ANNUAL O & M: $17,200 PRESENT WORTH: $1,270,000	**M-A: ON-SITE LANDFILL (CONSOLIDATION)** CAPITAL COST: $4,510,000 ANNUAL O & M: $18,700 PRESENT WORTH: $4,800,000	**G-A: MONITORING AND NATURAL ATTENUATION** CAPITAL COST: $53,600 ANNUAL O & M: $57,800 PRESENT WORTH: $940,000	**UPDATED RESIDENTIAL COST ON-SITE DISPOSAL (1)** CAPITAL COST: $13,600,000 ANNUAL O & M: $0 PRESENT WORTH: $13,600,000	**DRUM DISPOSAL COST** CAPITAL COST: $11,200 ANNUAL O & M: $0 PRESENT WORTH: $11,200	**RAPID RESPONSE PROGRAM** CAPITAL COST: $9,000,000 ANNUAL O & M: $0 PRESENT WORTH: $9,000,000
RF-A: ON-SITE TREATMENT OFF-SITE DISPOSAL CAPITAL COST: $999,000 ANNUAL O & M: $17,200 PRESENT WORTH: $1,260,000	**M-B: ON-SITE LANDFILL ON-SITE TREATMENT** CAPITAL COST: $28,700,000 ANNUAL O & M: $20,100 PRESENT WORTH: $29,000,000	**G-B: PUMPING, POTW DISPOSAL MONITORING FOR OTHER AREAS** CAPITAL COST: $466,000 ANNUAL O & M: $165,000 PRESENT WORTH: $2,990,000	**UPDATED RESIDENTIAL COST OFF-SITE DISPOSAL** CAPITAL COST: $15,100,000 ANNUAL O & M: $0 PRESENT WORTH: $15,100,000		
RF-A: OFF-SITE TREATMENT, DISPOSAL CAPITAL COST: $1,110,000 ANNUAL O & M: $17,200 PRESENT WORTH: $1,370,000	**M-C1: OFF-SITE LANDFILL OFF-SITE TREATMENT** CAPITAL COST: $64,800,000 ANNUAL O & M: $0 PRESENT WORTH: $64,800,000	**G-C: SLURRY WALL, PUMPING POTW; MONITORING FOR OTHER AREAS** CAPITAL COST: $16,600,000 ANNUAL O & M: $97,800 PRESENT WORTH: $18,100,000			
RF-B: ON-SITE TREATMENT, DISPOSAL (1) CAPITAL COST: $2,020,000 ANNUAL O & M: $0 PRESENT WORTH: $2,020,000	**M-C2: OFF-SITE LANDFILL ON-SITE TREATMENT** CAPITAL COST: $34,600,000 ANNUAL O & M: $0 PRESENT WORTH: $34,600,000				
RF-B: ON-SITE TREATMENT OFF-SITE DISPOSAL CAPITAL COST: $2,180,000 ANNUAL O & M: $0 PRESENT WORTH: $2,180,000	**M-D: ON-SITE TREATMENT OFF-SITE RECYCLING, DISPOSAL** CAPITAL COST: $87,400,000 ANNUAL O & M: $0 PRESENT WORTH: $87,400,000				
RF-B: OFF-SITE TREATMENT, DISPOSAL CAPITAL COST: $2,610,000 ANNUAL O & M: $0 PRESENT WORTH: $2,610,000					

Notes:
(1) - CAN ONLY BE USED IN CONJUNCTION WITH ALTERNATIVES M - A AND M - B

TO ARRIVE AT TOTAL REMEDIAL COST, ONE COMPATIBLE ALTERNATIVE FROM EACH COLUMN MUST BE INCLUDED

PRESENT WORTH VALUES ASSUME 30 YEARS OF OPERATION AT A 5% INTEREST RATE

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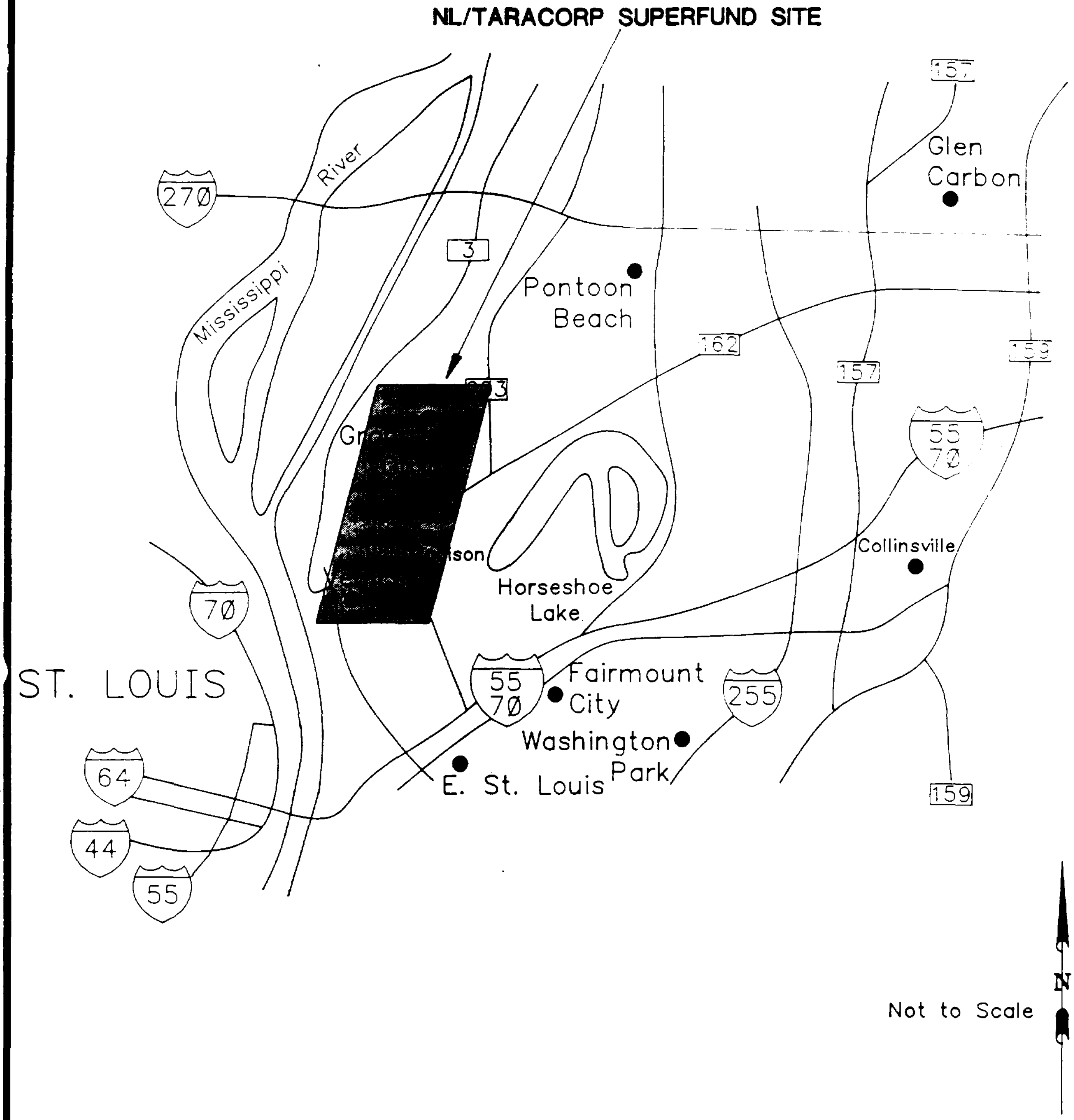
TABLE 4-6
COMPARISON OF 1989 FS vs. PDFI REMEDIATION VOLUMES

LOCATION	1989 FS ESTIMATE (O'BRIEN & GERE) (CUBIC YARDS)	PDFI ESTIMATE (W-C) (CUBIC YARDS)
TARACORP / SLLR PILES	91,000	118,000
MAIN INDUSTRIAL AREA	3,500	35,000
ADJACENT RESIDENTIAL AREAS	13,400	92,900
REMOTE FILL AREAS	3,400	20,000
COMBINED TOTAL	111,300	265,900
TOTAL EXCLUDING PILES	20,300	147,900



SITE LOCATION

NL/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS U.S. ARMY CORPS OF ENGINEERS	PROJECT NO. C3M11Q

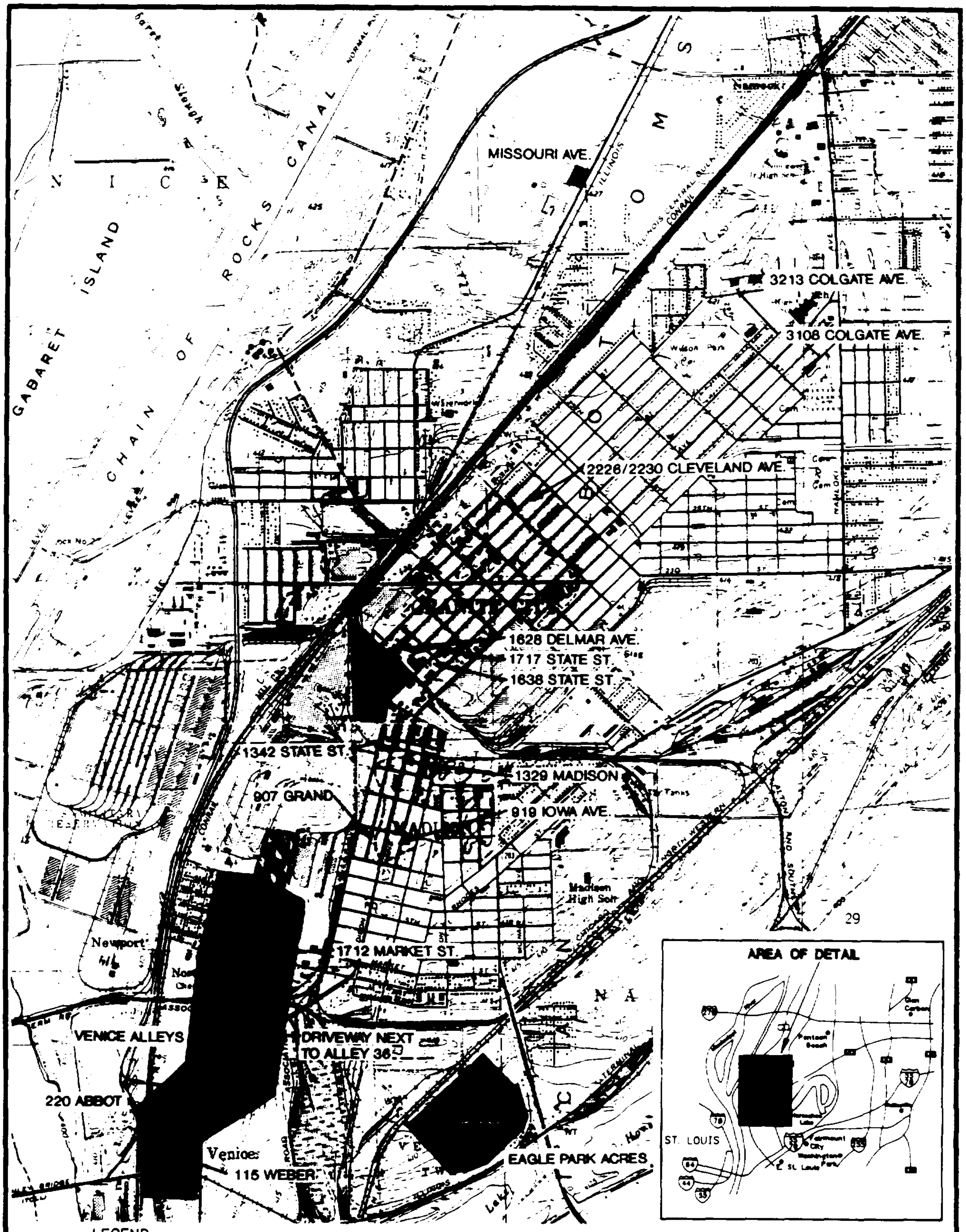
Woodward-Clyde Consultants

Engineering & sciences applied to the earth & its environment

DRN. BY: kdw 1/7/94 DSGN. BY: C.F.H. 1/5/94 CHKD. BY: DLF	Site Location Map	FIG. NO. 1-1

File name \GRANITE\C3M11Q\FIG1-1.DWG Last ed. 94/01/07 @ 16:

File name: G:\C3M11Q\FIG1-2.DWG Last edited: 93/07/23 ● 08:32



LEGEND

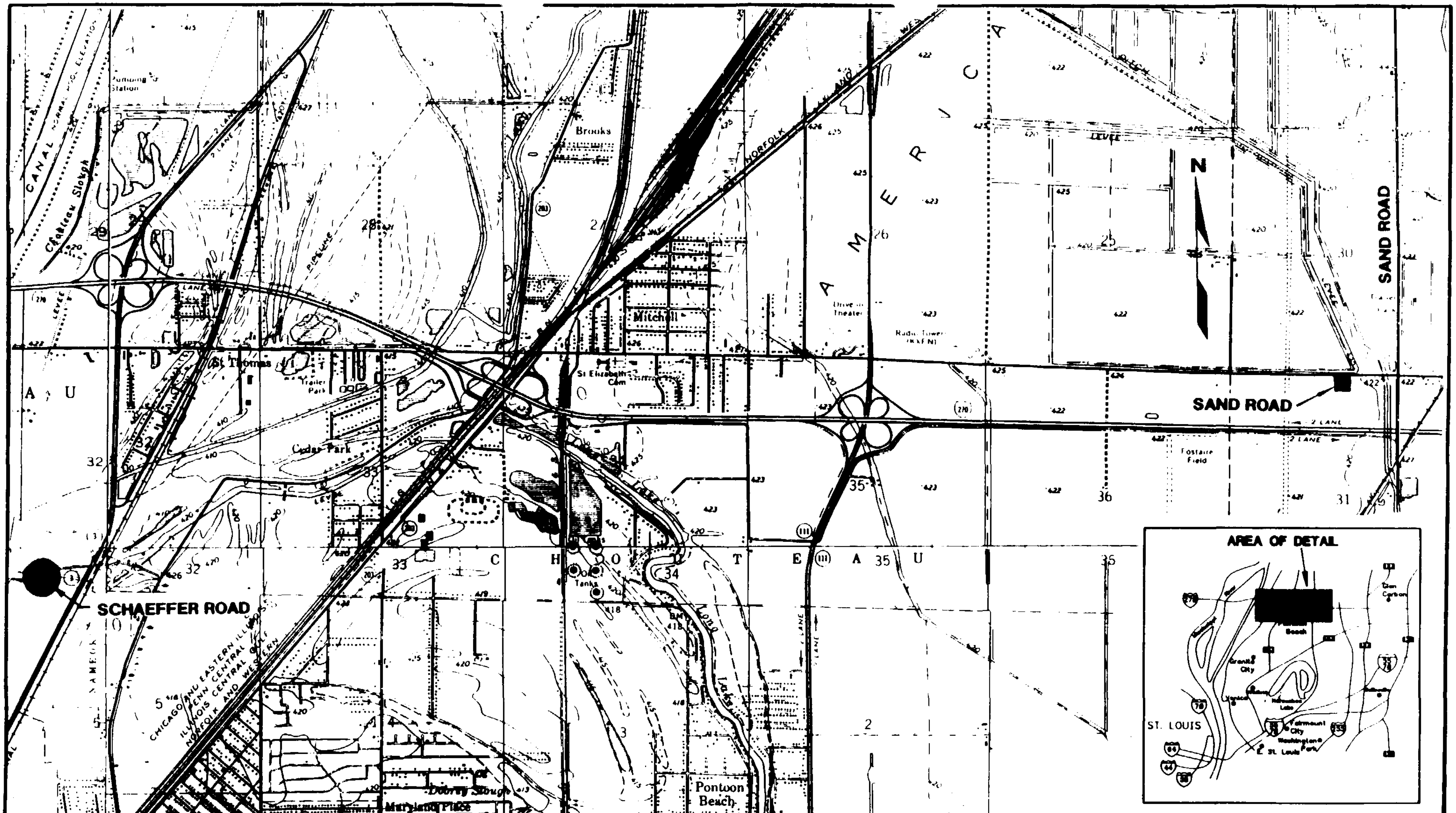
- REMOTE FILL AREAS
- INDUSTRIAL AREAS
- RESIDENTIAL AREAS

NOTE: Drawing taken from U.S.G.S. – Granite City, IL–MO and Monks Mound, IL Quadrangles dated 1982 & 1974.

0 2000 4000

SCALE FEET

NL/TARACORP SUPERFUND SITE SUPPLEMENTAL INVESTIGATION	PROJECT NO C3M11Q
Woodward-Clyde Consultants — Engineering & sciences applied to the earth & its environment	
DRN. BY: kdw 7/23/93 DSGN. BY: CHKD. BY:	Site Plan South — FIG. NO. 1-2



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1 MILE

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DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

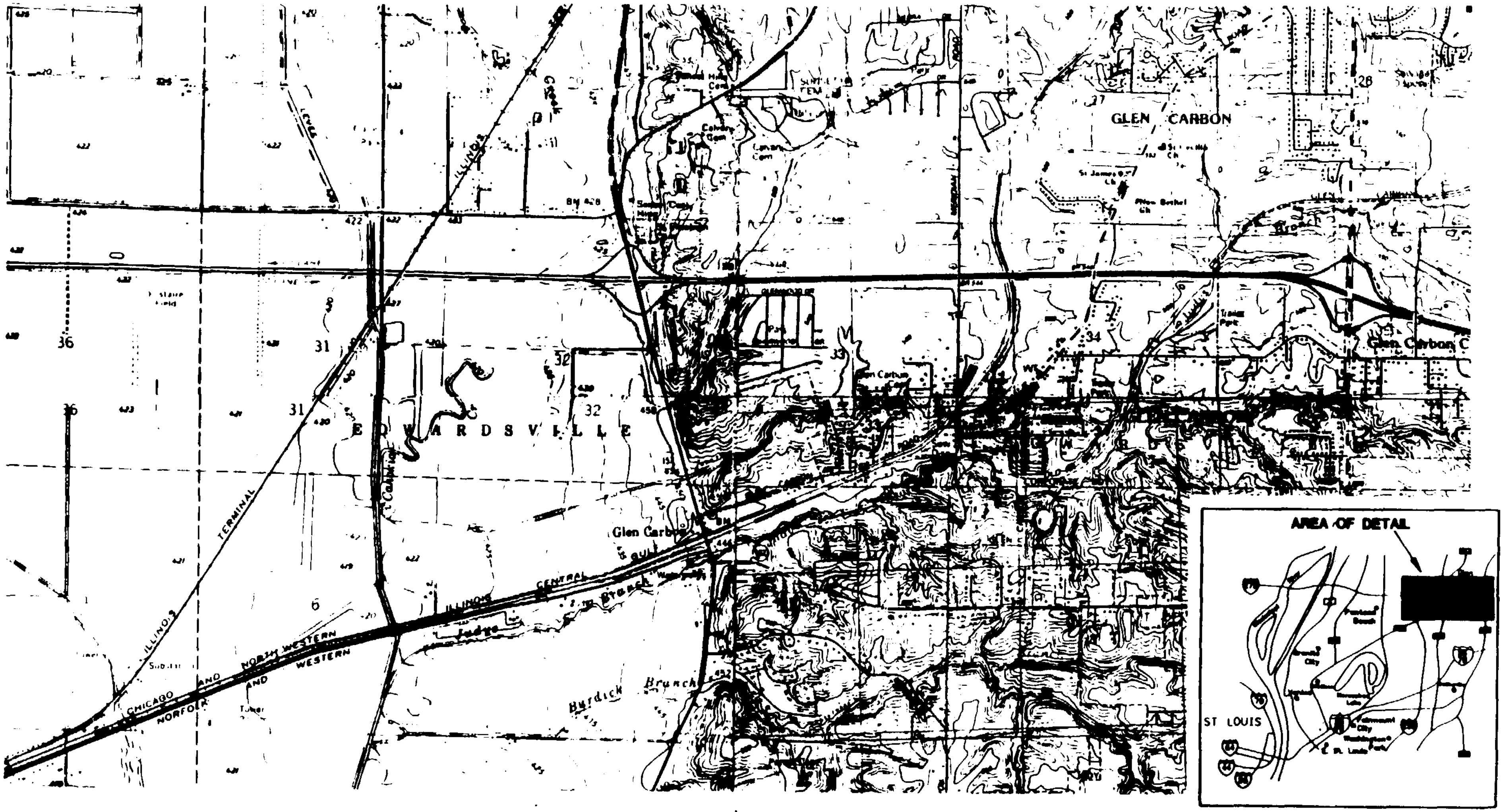
■ REMOTE FILL AREAS

NOTE: Drawing taken from U.S.G.S - Columbia Bottom, MO-IL, 1974; Wood River, IL-MO, 1974; Monks Mound, IL, 1974; Granite City, IL-MO, 1982.

NL/TARACORP SUPERFUND SITE U.S. ARMY CORPS OF ENGINEERS GRANITE CITY, ILLINOIS	PROJECT NO 89MC114V

Woodward-Clyde Consultants
CONSULTING ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS

DRN BY kmm 7/22/91 CHKD BY	Site Plan North	FIG NO 1-3



LEGEND

■ REMOTE FILL AREA

NOTE: Drawing taken from U.S.G.S. – Collinsville, IL dated 1991, Monks Mound, IL dated 1954, Wood River, IL-MO dated 1955 and Edwardsville, IL dated 1991.

N

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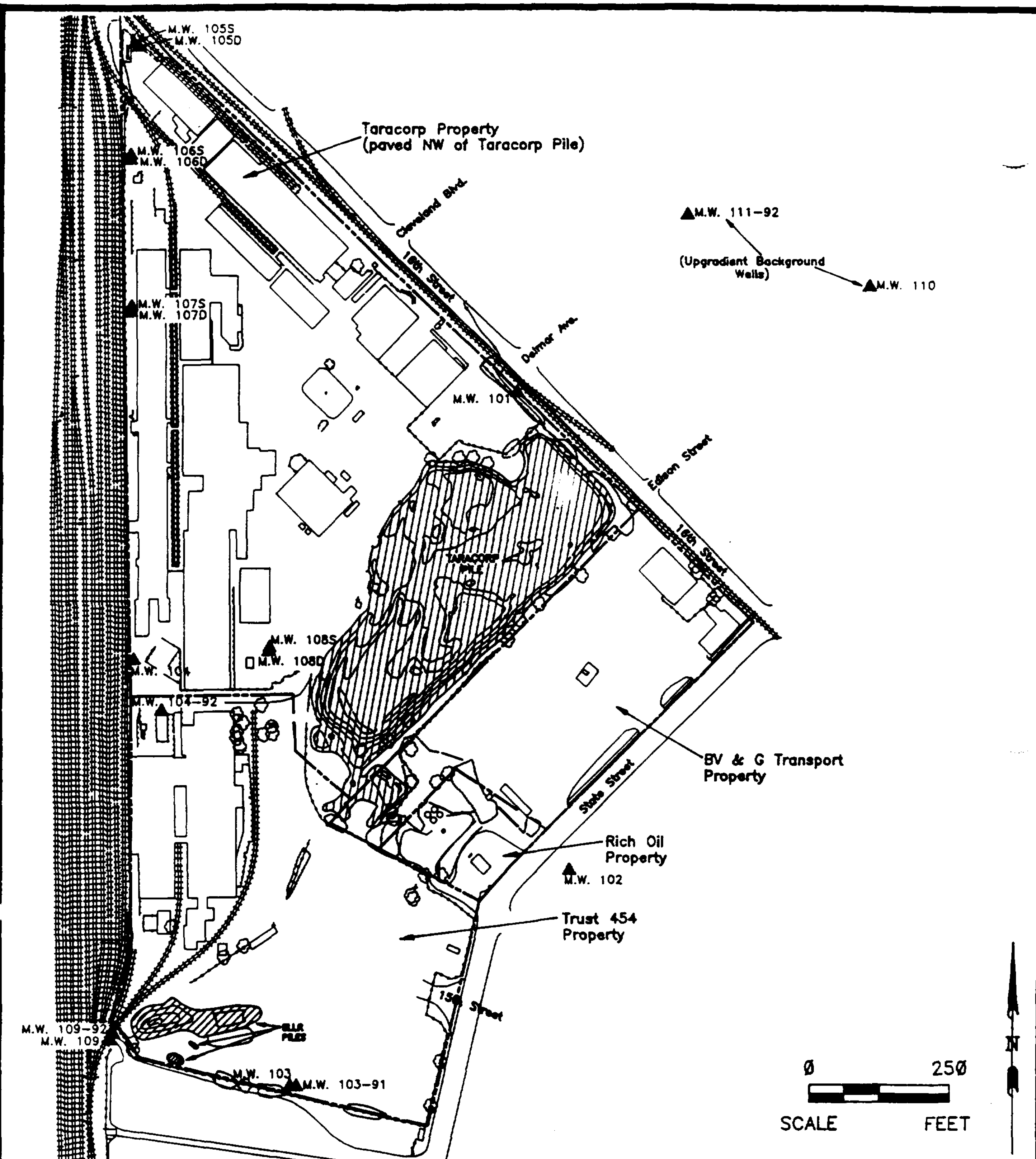
NL/TARACORP SUPERFUND SITE SUPPLEMENTAL INVESTIGATION	PROJECT NO C3M11Q
Woodward-Clyde Consultants Engineering & sciences applied to the earth & its environment	
DRN. BY: lm 8/4/93 DSGN. BY: AKP CHKD. BY:	Site Plan East	FIG NO 1-4

File name: D:\C3M11Q\FIG1-3.DWG Last edited: 93/08/04 @ 08:47



File nam. G:\GRANITE\C3M11Q\FIG1-5.DWG edited: 94/01 @ 11:44

LEGEND

▲ M.W. 108S DENOTES MONITORING WELL

---------- DENOTES PROPERTY LINE

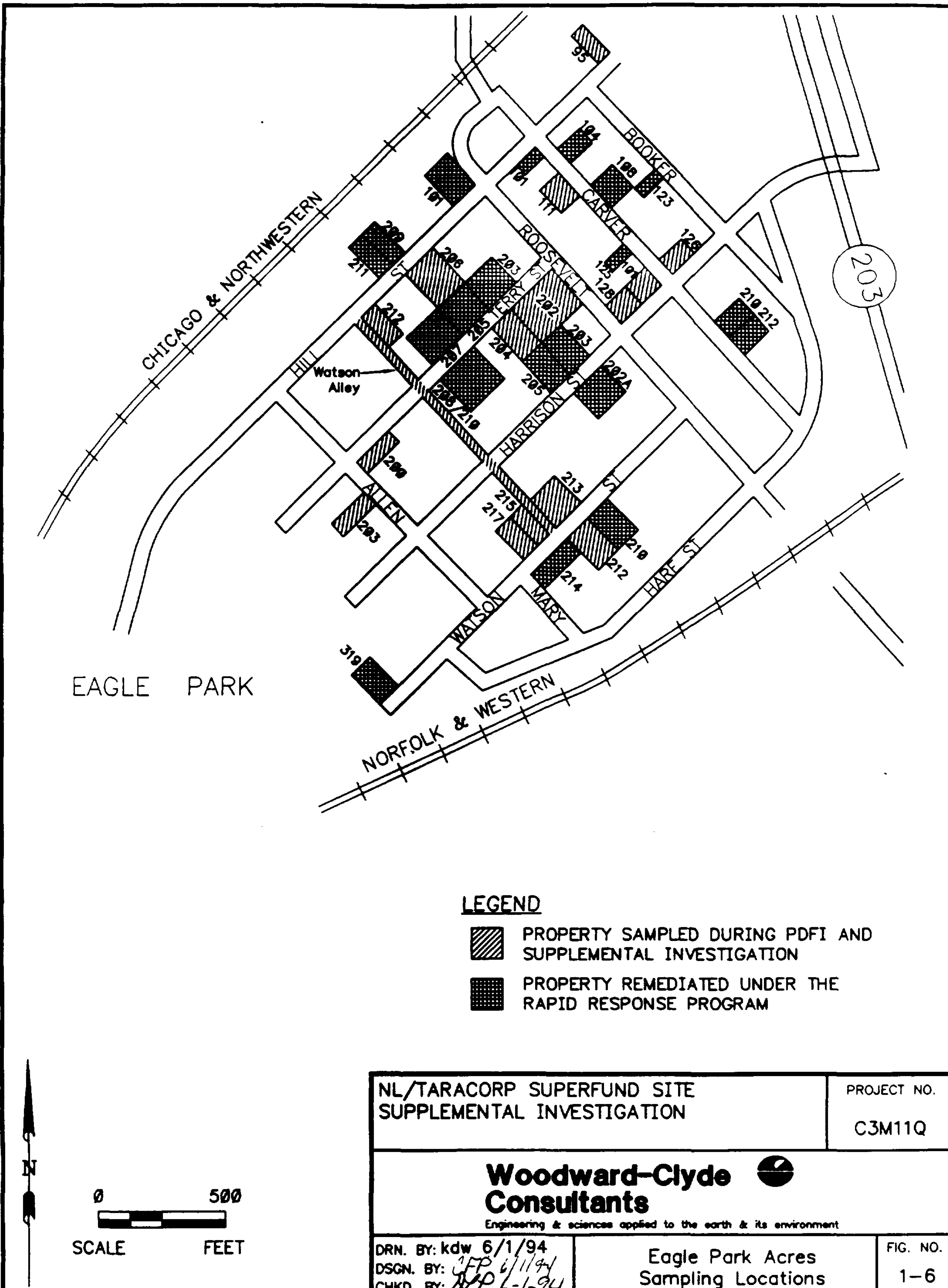
NL/TARACORP SUPERFUND SITE PDFI GRANITE CITY, ILLINOIS U.S. ARMY CORPS OF ENGINEERS	PROJECT NO. C3M11Q

Woodward-Clyde Consultants

Engineering & sciences applied to the earth & its environment

DRN. BY: kdw 11/11/93 DSGN. BY: CFP 11/11/93 CHKD. BY: GLP 12/06/93	Main Industrial Property Site Plan	FIG. NO. 1-5

File: G:\GRANITE\C3M11Q\FIG1-6.DWG Last edited: 06/01/94 ● 4:27 p.m. ● WCC-ST.LOUIS

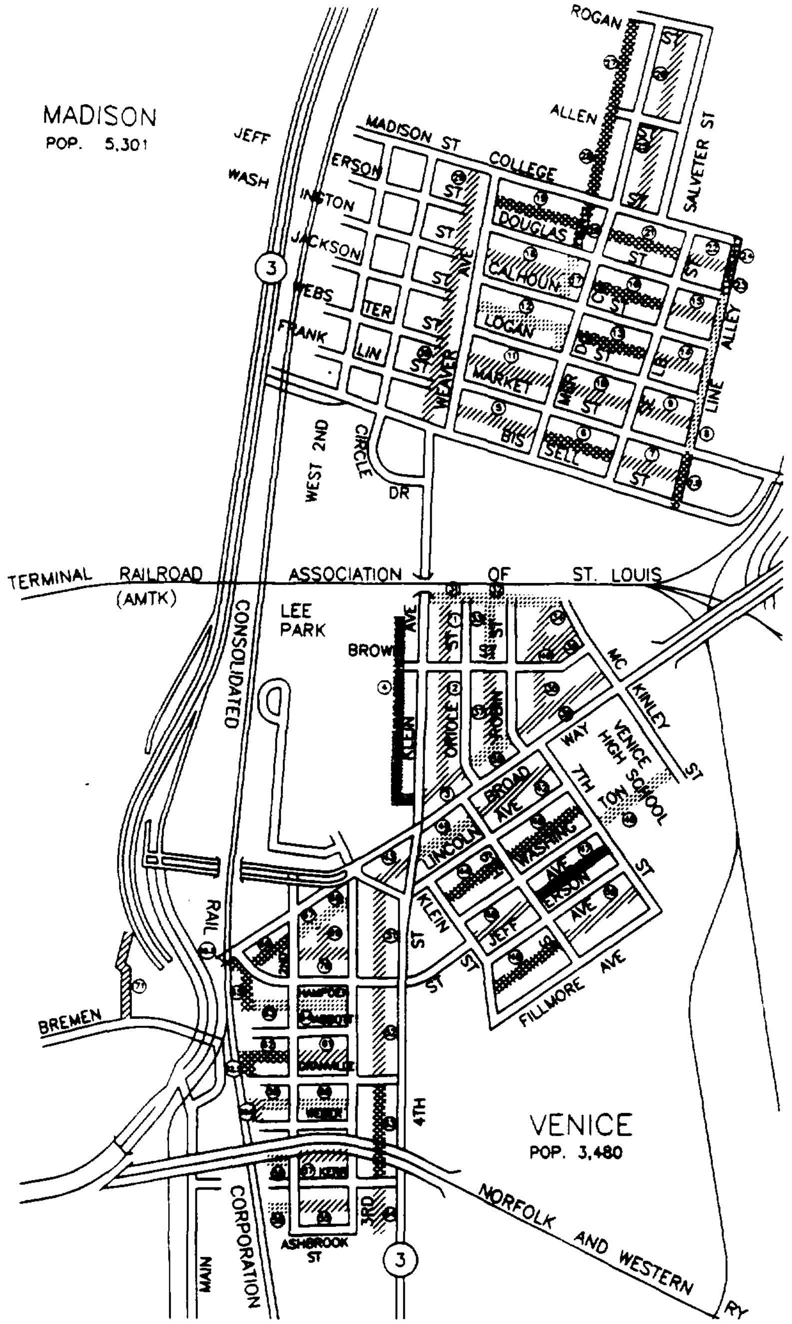


NL/TARACORP SUPERFUND SITE SUPPLEMENTAL INVESTIGATION	PROJECT NO. C3M11Q

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

DRN. BY: kdw 6/1/94 DSGN. BY: JFP 6/1/94 CHKD. BY: 6-1-94	Eagle Park Acres Sampling Locations	FIG. NO. 1-6

File: G:\GRANITE\C3M11Q\FIG1-7A.DWG Last edited: 09/27/94 ● 09:42 a.m ● WCC-ST.LOUIS



LEGEND

- - - SAMPLED ALLEY

CAT. I – REMEDIATED BY OHM

CAT. II – SAMPLED, TOTAL SOIL LEAD OVER 500mg/kg, REMEDIATION REQUIRED

CAT. III – SAMPLED, NO REMEDIATION REQUIRED

CAT. IV – NO ACTION

N

0 800 1600

SCALE FEET

NL/TARACORP SUPERFUND SITE SUPPLEMENTAL INVESTIGATION	PROJECT NO. C3M11Q
Woodward-Clyde Consultants — Engineering & sciences applied to the earth & its environment	
DRN. BY: kdw 2/14/94 DSGN. BY: CHKD. BY: — Venice Alley Location Map	FIG. NO. 1-7

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

HSRL-6J

FEB 15 1995

Mr. Gene Liu
U.S. Army Corps of Engineers
215 North 17th Street
Attn: CEMRO-ED-ED
Omaha, NE 68201-4978

RE: Approval of Second Addendum to the Feasibility Study
NL Industries/Taracorp Site, Granite City, Illinois

Dear Mr. Liu:

The United States Environmental Protection Agency (U.S. EPA) hereby approves the February 1995 "Second Addendum to the Feasibility Study" for the NL Industries/Taracorp Site in Granite City, Illinois.

If you have any questions, you may contact Sheri L. Bianchin at (312) 886-4745 or me at (312) 886-4742.

Sincerely,

Sheri L. Bianchin
for Brad Bradley
Remedial Project Manager

cc: Bob Rogers, IEPA

Printed on Recycled Paper

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

MAR 18 1994

HSRL-6J

Gene Liu
U.S. Army Corps of Engineers
ATTN: CEMRO-ED-ED
215 North 17th Street
Omaha, Nebraska 68102-4978

Dear Mr. Liu:

U.S EPA and the Illinois EPA have reviewed the January 1994 "Draft Addendum to the Feasibility Study" and have the following comments:

GENERAL

1. The FS Addendum needs to be written as an addendum, not a new FS. The following should be stated in the introduction to this document:

   a. the reason the addendum is being prepared (new information has revealed that the waste pile is the source of significant ground water contamination, greatly increased number of remote fill areas),

   b. the fact that this is the second FS Addendum (title should be changed), and that the first FS Addendum was written on January 10, 1990,

   c. brief mention of the two ESDs that have been issued (5/7/93 allowing off-site disposal of battery chips and associated soil that pass the TCLP and 1/27/94 allowing off-site disposal of residential soils, as opposed to consolidation with the Taracorp pile),

   d. what is not being addressed by the addendum, i.e. the residential soil cleanup level and method (excavation), the main industrial area cleanup level and method (excavation), and the Taracorp drums. These aspects of the remedy should be discussed only to the extent that alternatives in the Second Addendum affect the ultimate disposition of excavated materials (e.g. on-site landfill, off-site landfill, consolidate with Taracorp pile), and

   e. work that has already been performed and the total cost of this work. The total cost to use is $ 9,000,000 and U.S. EPA will provide Woodward-Clyde with a final list of properties remediated with the $ 9,000,000. This figure should be added into all cost estimates, and a grand total cost of remediation should be presented for each alternative.

2. A discussion of potential ground water contamination in remote fill areas should be included in the report, and a provision for ground water monitoring in the remote fill areas should be added to all ground water alternatives except "no action".

3. The alternatives should be broken down into media-specific alternatives and not combined. The alternatives should be as follows:

<u>Alleys/Other Remote Fill Areas</u>

-no action (monitoring)
-capping
-capping/removal combination
-removal

<u>Ground Water</u>

-no action (monitoring)
-pump and discharge
-pump, treat, and discharge
-slurry wall, pump, treat, and discharge

<u>Waste Piles</u>

-no action
-consolidate and cap
-solidification/on-site landfill
-recycle/solidification/on-site landfill
-solidification/off-site landfill
-recycle/solidification/off-site landfill

4. It appears that the regulatory changes that occurred since the original Feasibility Study (FS) was issued is the 35 IAC Part 620 groundwater quality regulations. The 620 regulations were adopted after the Record of Decision (ROD) was signed. The NCP has built in the "frozen ARAR" policy for requirements that change after a ROD is signed. The NCP also discusses five year reviews to evaluate the protectiveness of a remedy if requirements have changed.

5. Carry all comments throughout the entire text of the document.

SPECIFIC

1. Page ES-1, Second Paragraph, first sentence- delete ", and to review regulatory changes that have occurred since the original FS was issued" from this sentence.

2. Page ES-1, Third Paragraph, line 1 - Replace "is the location of" with "includes".

3. Page ES-1, Third Paragraph, line 4 - Replace "an adjacent property (now Trust 454)" with "Trust 454, which is a portion of the Site adjacent to the former smelter."

4. Page ES-1, Paragraph 6, line 2 - Delete "believed to be".

5. Page ES-1, Last Paragraph, second line- insert ",and Venice," between "Madison" and "Illinois".

6. Page ES-2, Paragraph 1, line 2 - Delete "in the vicinity".

7. Page ES-2, Paragraph 3 - Rewrite paragraph to reflect that EPA never accepted the risk assessment prepared by NL Industries through its contractor, O'Brien and Gere, because the methodology used was fundamentally flawed. Also, in lines 3-4, delete "appear to be" and replace with "are".

8. Page ES-2, Paragraph 7 - State why the groundwater should be classified as a Class I aquifer. Starting with line, 3, "On this basis..." delete the rest of the paragraph since it seems to be giving a remedial recommendation rather than just laying out the options.

9. Page ES-2, line 3- insert "and Venice" between "Madison" and "and".

10. Page ES-2 -delete the third paragraph.

11. Page ES-2- delete the sixth paragraph.

12. Page ES-2, Last Paragraph- Explain why remedial action objectives are based on the Illinois Ground Water Quality Standards.

13. Page ES-2, Last Paragraph, line 2- insert "IEPA" between "the" and "definition".

14. Page ES-2, last line and ES-3, first two lines- replace "remediation will be required" with "will need to be addressed" and delete the sentence that follows.

15. Page ES-3, Paragraph 1 - Air quality objectives have also been met during remedial action activities.

16. Page ES-3, Paragraph 2 - Alternatives ordinarily start with the "no action" alternative, not a "limited action" alternative. Because we have an existing ROD, it is inappropriate to discuss the no action alternative. We should say this option won't be discussed here in light of the ROD and consideration of the no action alternative in the original FS.

17. Page ES-4 - Delete all but the first sentence. The proposed plan is the proper place to make the cleanup recommendations, not the FS.

18. Page 1-1, First Paragraph- General Comment #1 applies here.

19. Page 1-1, First Paragraph, fifth sentence- delete "review and update the existing FS and" and the word "an" from this sentence.

20. Page 1-1, First Paragraph, last sentence- delete "and a summary of significant regulatory changes that potentially affect the remediation of the site" from this sentence.

21. Page 1-2, Section 1.2, first line- insert "almost entirely" between "located" and "within".

22. Page 1-3, line 3- insert ", and Venice" between "Madison" and the end parenthesis.

23. Page 1-3, Section 1.2.1.2, line 3- same as above comment.

24. Page 1-3, Section 1.2.1.2, line 5- replace "believed to be " with "primarily".

25. Page 1-4, top- list all remote fill locations, even those that have already been remediated.

26. Page 1-4, Section 1.2.3- retitle this section "Summary of the ROD" and delete the first paragraph.

27. Page 1-5, last line- mention that the Taracorp pile also failed the EP Tox for cadmium.

28. Page 1-7, first line- weren't there also 6-12 inch samples taken?

29. Page 1-7, First Full Paragraph- there is a discrepancy between the figures of 956 residences and 844 residences mentioned in this paragraph.

30. Page 1-7, First Full Paragraph, seventh line- the range of concentrations listed for the RI/FS seems incorrect.

32. Page 1-8, Last Two Paragraphs, bottom of Page 1-9, and top of Page 1-11- General Comment #1 applies here.

33. Page 1-11, Paragraph 4 - There is no formal MCL for lead. 15 ppb is an action level which has been used by EPA as if it is an MCL. Delete the last sentence stating that IEPA has the authority to grant a variance.

34. Page 1-12, Top Paragraph - Replace "MCL" with "action level."

35. Page 1-12, Paragraph 2 - The MCL for Cadmium is 0.005 mg/l.

36. Page 1-12, Paragraph 5 - State why we chose unfiltered samples.

37. Page 1-12, Last Paragraph - It was recommended by the IEPA in previous conversations with W-C that both filtered and unfiltered samples be taken to allow for direct comparison with the RI/FS data.

38. Page 1-13, Paragraph 2 - Replace "current MCL" with "action level".

39. Page 1-14, Paragraph 1, line 4 - Correct spacing in "Runofffrom".

40. Page 1-14, Paragraph 2, last line - Delete "unless a waiver is requested from and granted by the IEPA", or even delete the whole last sentence.

41. Page 1-14, Section 1.4.5, second line- insert "and ingestion" between "contact" and "routes".

42. Page 1-14, Section 1.5- delete this section.

43. Page 1-16, § 1.6, last paragraph - Insert "all or part of" after "enforce" on line 2.

44. Page 1-17, § 1.6.1.3 - EPA's guidance on soil remediation is not an ARAR, but was written to serve as guidance because there is no ARAR on soil contaminated with lead. The FS addendum should present the guidance this way, rather than stating that it is an ARAR. Also, this paragraph misstates the guidance. The guidance suggests a range of 500-1000 ppm for residential areas, but also says that the actual cleanup level may be higher or lower based on site specific factors. The guidance has been supplemented to recommend the use of the UBK model. The guidance referred to does not propose an industrial cleanup level.

45. Section 1.6.1.3 should address the corrective action management unit (CAMU) provisions of 40 CFR 264.522. These requirements are likely to apply in those alternatives where soil is brought on site either for storage and/or treatment. If the concept of CAMUs is not utilized, then ARARs particular to the type of units used (tanks, containers, waste piles, etc;) would have to be included.

46. Page 1-17, Section 1.6.1.3, ninth line- insert "or consolidated with the Taracorp pile" at the end of the sentence in this line.

47. Page 1-18, Top of Page - Replace "MCL" with "action level."

48. Page 1-18, Section 1.6.2 - The bulleted items for final cover requirements of a landfill pertain to landfills constructed and operated under 35 IAC 724.401. 724.401(c) states that the bottom must be equivalent to 3 feet of clay with a hydraulic conductivity of 10^{-7} or less, with a leachate collection system. In order to implement alternative C, the requirements for landfills 35 IAC 724 Subpart N must be met.

49. Page 1-20, Paragraph 4 - Wetlands is one word. The underlined portion says "Wet Lands".

50. Page 1-20, Last paragraph - Delete portion which states EPA is required to comply with all local requirements which may be applicable. Rewrite to say "Remedial activities will be required to comply with pretreatment requirements of the local Publicly Owned Treatment Works (POTW) for acceptance for disposal of either ..."

51. Page 1-21, Section 1.7.1, Line 3 - Replace "appear to correspond" with "corresponds".

52. Page 1-21, Section 1.7.1, Second Paragraph, first line- insert "on the main industrial property" between "areas" and "as".

53. Page 2-4, Section 2.3.1- make a statement that institutional controls will be implemented wherever wastes have been left in place.

54. Page 2-7, top- unless a much better justification can be given, a slurry wall should also be considered further.

55. Page 2-7, Section 2.3.3.2 - Pump and treat systems are usually considered as long-term remedial actions, not removal actions.

56. Page 2-9, last bullet point- more discussion must be provided for eliminating ex-situ vitrification (e.g. prohibitively expensive).

57. Page 2-9, fifth line from bottom- don't you mean EPA Region X?

58. Page 2-9, second to last sentence- Please verify that this is a true statement.

59. Some of the alternatives (e.g. pages 2-10 and 3-8) identify the removal of contaminated soil and fill from off-site locations. It appears that the excavated material would be transported to the site for treatment, or sent off-site for treatment and/or disposal. The document does not document how the material will be stored at the site of excavation prior to transportation. It would be better to store the material in trucks, containers or tanks; storing it in a waste pile would trigger much more involved ARARs.

60. Page 2-10- delete discussions of alternate technologies that apply only to residential soil remediation.

61. Section 3- General Comments #1 and #3 should be applied in this section.

62. Page 3-4, Second Paragraph, last line- insert "or rock" between "concrete" and "in".

63. Page 3-6, line 4- delete "capped with" and substitute "repaired/replaced" for "replaced" in this line.

64. A statement is made on page 3-9 that, "Slag material, hard rubber, and plastic would be shipped to a secondary lead smelter with a RCRA permit for lead recovery ..." This is incorrect. It should really say that it would be shipped to a secondary lead smelter with either a RCRA permit or interim status to store the material prior to recovery. The storage of the material is RCRA regulated; the actual recycling of the material is exempt.

65. Page 3-9, First Paragraph, second to last sentence and Second Paragraph, sixth sentence- are the statements in these sentences true? This needs to be discussed further.

66. Page 3-9, second to last line- delete "and any fill" from this line.

67. Page 3-13, third to last line- insert "and/or rock, asphalt, or concrete" after "sod".

68. Page 3-18- costs presented should be total remedial costs for the entire remedy, including the particular aspects of each separate alternative.

69. Section 4 - In general, compare these alternatives with the remedy selected in the ROD.

70. Page 4-2 - As contained in the NCP please replace "Interagency Acceptance" with "State Acceptance."

71. Page 4-4, Section 4.2.2, sixth line- delete "residential and".

72. Page 4-4, Section 4.2.2, Paragraph 3 - Say why long term protection will be difficult to maintain. Do we agree with this conclusion? Or maybe it should be stated that it poses a risk to long term protection not present in alternatives which use a liner or remove the dump.

73. Page 4-4, Section 4.2.2, Third Paragraph, line 3- delete "through property purchase".

74. Page 4-5, Paragraph 1 - See comment at Page 1-7, Section 1.6.1.3 - This is not an ARAR. This mistake is carried out throughout the document, including at pages 4-8, 4-12, 4-16, 4-19, 4-23, 4-26, 4-29, 4-33, and table 1-5. It is acceptable to include a discussion of this guidance and what was selected in the ROD, but it should be pointed out that it is not an ARAR.

75. Page 4-5, Paragraph 6 - Rewrite this paragraph as follows: "The remedial action required by Alternative B would not meet the Illinois Groundwater Standard in a Class I aquifer or the USEPA action level". Delete the remainder of this paragraph, including references to obtaining a waiver from IEPA. CERCLA authorizes U.S. EPA to make the waiver determinations.

    The above comment also applies to the similar paragraph in the addendum which appears at pages 4-9, 4-13, 4-17, 4-20 and 4-23.

76. The ARARs identified on page 4-5, for Alternative B make no reference to the "RCRA Subtitle C compliant cap" identified in the description. It would seem that reference to the State of Illinois requirements equivalent to those in 40 CFR 264.10 should be identified.

77. Page 4-5, ARARs discussion- capping at remote fill areas will not meet the 500 ppm lead cleanup level for residential areas.

78. Page 4-5, bottom- this alternative will not address ground water contamination.

79. Page 4-6, Last Two Full Paragraphs- it should be noted that extensive grading and possibly relocation of the Taracorp office building will be required to meet slope requirements for capping. This affects implementability and has potential for fugitive dust generation.

80. Page 4-8, First Full Paragraph- this alternative also does not address ground water contamination.

81. Page 4-9, "Long Term Effectiveness"- this alternative offers no treatment of ground water and allows the source to be left in place.

82. Page 4-10- same as comment #71.

83. Page 4-17, "Reduction of Toxicity..."- ultimately, toxicity is not affected by this alternative, mobility decreases and volume increases at a landfill.

84. Page 4-19, second sentence- what does this sentence mean?

85. Page 4-20- same as comment #75.

86. Page 4-22- delete first full paragraph.

87. Page 4-22, Last Full Paragraph- same as comment #76.

88. Page 4-23, second word- change "controlled" to "eliminated".

89. Page 4-24, "Reduction of Toxicity..."- recycling reduces the volume and toxicity, and stabilization decreases mobility and increases volume.

90. Page 4-24, "Short Term Effectiveness", third sentence- add "and possible recontamination of nearby residential yards that have been remediated" to the end of this sentence.

91. Page 4-35 - Why is the comparison section (the whole section, not just this page) including a discussion of the residential areas? This is beyond the scope of this addendum.

92. Page 4-35, last word and Page 4-36, first two words- replace "adjacent residential areas" with "ground water".

93. Page 4-36 - Overall protection of human health should also be discussed in comparison with the remedy in the ROD.

94. Page 4-36, "Taracorp Pile" heading- add ",SLLR Pile, and Ground Water" to this heading.

95. Page 4-36, "Taracorp Pile" Paragraph, third line from bottom- insert "greatly" between "also" and "accelerate".

96. Page 4-36, Last Paragraph- delete this paragraph>

97. Page 4-37, first sentence- insert "SLLR pile" after "pile", and replace ". or adjacent residential areas." with ", and ground water."

98. Page 4-37, "Taracorp Pile" Paragraph, fourth line from bottom- replace "address" with "allow" and insert "to be obtained" between "ARAR" and "by".

99. Page 4-37- delete last paragraph.

100. Page 4-38, fourth line- replace "by limiting" with "for direct contact but not".

101. Page 4-38, fifth line- insert the following sentence: "Capping would prolong the ultimate leaching process."

102. Page 4-38, Last Paragraph- delete "and Adjacent Residential Areas" from the title.

103. Page 4-38, fourth line from bottom- insert "direct contact but not" between "limited" and "leaching".

104. Page 4-39, third line- add "or volume" after "toxicity".

105. Page 4-39, eighth line- replace "control" with "prevent".

106. Page 4-39, Second Paragraph- same as comment #94.

107. Page 4-39, fifth line from bottom- insert "the large degree of" between "by" and "regrading", and add "to meet slope requirements" after "pile".

108. Page 4-40, Section 4.3.6- time estimates (from onset of remedial action) should be provided in this section.

109. Page 4-40, Last Paragraph- same as comment #94.

110. Page 4-44, Section 4.4, Second Paragraph- add "Alternative F reduces the size of the problem off-site." to the end of this paragraph.

111. Page 4-45, first line- insert "capital" between "estimated" and "costs".

112. Page 4-45, Middle Paragraph, sixth line- replace "capping" with "removing".

113. Page 4-45, Middle Paragraph, seventh line- replace "minimized" with "eliminated".

114. Page 4-45, Middle Paragraph, last sentence- insert "Capping will slow leaching and will prolong natural attenuation in comparison with no action." before this sentence.

115. Page 4-45- delete the last paragraph.

116. Page 5-1, bottom- add the EPA Addenda to the RI and the FS to the references.

117. Table 1-1- add a summary of venice alleys to this table.

118. Table 1-5 summarizes the ARARs applicable to the various alternatives. As a broad summary, it is reasonable. However, it does not identify individual requirements. As a result, one cannot determine exactly what ARARs are applicable. This seems to be a problem, as the text of the report only identifies chemical specific ARARs, and refers the reader to the table for the action specific and location specific ARARs.

119. Table 2-1- this table should be broken down to media-specific remedies.

120. Table 2-2- this table should be modified to reflect previous comments.

121. Table 4-1- change per other comments.

122. Figure 1-2- the top two blocks of Venice are also part of the residential cleanup, and properties already remediated (e.g. 3108 Colgate, Missouri Avenue, 1628 Delmar) should be shown on this figure under different shading.

123. Figure 1-7- change the red shading key from "to be sampled by OHM" to "remediated", and shade the remediated properties. Also, add in alleys sampled by OHM but not remediated into the appropriate category.

124. Appendix A- delete this appendix and all references to it.

Please submit the second draft of the Second FS Addendum to U.S. EPA and IEPA within thirty days of your receipt of this letter. Since there are numerous comments on the document, the second draft should be a document that only needs fine tuning to become final. To help achieve this goal, U.S. EPA recommends a meeting with U.S. ACE and Woodward-Clyde as soon as practical to discuss and clarify the comments. Please contact me at (312) 886-4742 to arrange this meeting.

Sincerely,

Brad Bradley

Brad Bradley
Remedial Project Manager

cc: Dave Pate, Woodward-Clyde
Brian Culnan, IEPA

bcc: B. Kush
S. Siegel, CS-3T
G. Hruska, HRPL-8J

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

July 27, 1994

Mr. Brad Bradley
USEPA-HSRL-6J
Chicago, IL 60604

Re: 1190400007 -- Madison County
Taracorp/NL Industries
Superfund/Tech

Dear Brad,

Thank you for the opportunity to review and provide comments for the "Revised Second Addendum to the Feasibility Study." However, the IEPA does not have any additional comments. Please advise whether this document will be final, or if you have comments that will require revision of the current document.

If you have any questions please contact me at 217/782-6760.

Sincerely,

Brian Culnan

Brian Culnan, Remedial Project Manager
Federal Site Management Unit
Remedial Project Management Section
Bureau of Land

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

March 3, 1994

Brad Bradley
USEPA-HSRL-6J
77 W Jackson
Chicago, IL 60604

Re: 1190400007 -- Madison County
Taracorp/NL Industries
Superfund/Tech

Dear Brad,

Enclosed are IEPA comments generated from the review of the "Draft Addendum to the Feasibility Study."

If you have any questions, please contact me at 217/782-6760.

Sincerely,

Brian Culnan

Brian Culnan, Remedial Project Manager
Federal Site Management Unit
Remedial Project Management Section
Bureau of Land

GENERAL COMMENTS:

1. It appears that the regulatory changes that occurred since the original Feasibility Study (FS) was issued is the 35 IAC Part 620 groundwater quality regulations. The 620 regulations were adopted after the Record of Decision (ROD) was signed. The NCP has built in the "frozen ARAR" policy for requirements that change after a ROD is signed. The NCP also discusses five year reviews to evaluate the protectiveness of a remedy if requirements have changed.

2. After reviewing this document, it appears the lead agency has determined that the protectiveness of the remedy has not been affected, because the preferred remedy in this document is essentially the same as the selected remedy in the ROD.

3. Chapter 8 in the "Draft Guidance For Preparing Superfund Decision Documents; The Proposed Plan And Record Of Decision" discusses both significant differences to a component of a remedy, and fundamental differences that require amendment of the ROD. It appears from the conclusions drawn in this document that in order for the USEPA to address the groundwater contamination at the Taracorp site, a fundamental change to the remedy and subsequent amendment of the ROD will not be required. Therefore, the guidance suggests the groundwater contamination should be addressed through an Explanation of Significant Difference (ESD) document.

SPECIFIC COMMENTS:

1. Page ES-2. Paragraph 3. The IEPA questions the conclusion that a new risk assessment is not recommended. The 1988 baseline risk assessment did not include the risk from the groundwater pathway. This was apparently omitted due to the following:

   - The groundwater pathway was deemed to be incomplete due to an absence of receptors.

   - The samples taken in the RI were filtered samples and did not show adverse impacts to groundwater.

   - At that time a future use scenario was not required as part of the baseline risk assessment and therefore was not conducted. This item should also be stated in the addendum.

   Current risk assessment guidance would require a future use assessment of the groundwater as a drinking water exposure point, especially since the underlying aquifer meets the requirements of a Class I aquifer.

2. Page ES-3. A request for a technical impractibility waiver from the remediation of the site will be denied. Groundwater at the facility has been characterized as a Class I aquifer, and lead has been detected above the standards set forth in 35 IAC 620.410. If a contaminant exceeds a standard, pursuant to 35 IAC 620.302(c), the appropriate remedy is corrective action.

3. However, 35 IAC 620.250 allows for the establishment of a groundwater management zone (GMZ). A GMZ is a three dimensional region containing groundwater being managed to mitigate impairment caused by the release of contaminants from a site. Any chemical constituent in groundwater within a GMZ is subject to Section 620.450, Alternative Groundwater Standards. In accordance with 35 IAC 620.450(a)(4)(B), after completion of a corrective action as described in Section 620.250(a), the standard for such released chemical constituents the concentration as determined by groundwater monitoring, if such concentration exceeds the standard for the appropriate class designation for groundwater, and:

   a) The exceedance has been minimized to the extent practicable, and beneficial use for the class of groundwater has been returned.

   b) Any threat to public health or the environment has been minimized.

4. It is unclear whether the IEPA has the authority to grant a technical impractibility waiver on the basis of cost. The intent of a technical impractibility waiver as defined in the NCP was to not use cost as a basis of impractibility. As stated in the document due to the industrial nature of the area, a request to classify the groundwater as Class II may be desirable. However, the IEPA does not have the authority to grant this request. Any such request must be evaluated by the Illinois Pollution Control Board.

5. Page 1-11. Section 1.3.7. Paragraph 2. Please replace the "MCL for lead" with the "action level for lead."

6. - Last sentence in the above paragraph. As previously stated the IEPA does not have the authority to grant this variance but rather must be petitioned to the Illinois Pollution Control Board.

7. Page 1-12. Top paragraph. Replace "MCL" with "action level."

8. Page 1-12. Paragraph 2. The MCL for Cadmium is 0.005 mg/l.

9. Page 1-12. Last Paragraph. It was recommended by the IEPA in previous conversations with W-C that both filtered and unfiltered samples be taken to allow for direct comparison with the RI/FS data.

10. Page 1-14. Section 1.4.4. Last Sentence. Refer to comment 4 above.

11. Page 1-14. Section 1.5. Refer to comment 1 above regarding the baseline risk assessment.

12. Page 1-18. Top of Page. Replace "MCL" with "action level."

13. Page 1-18. Section 1.6.2. The bulleted items for final cover requirements of a landfill pertain to landfills constructed and operated under 35 IAC 724.401. 724.401(c) states that the bottom must be equivalent to 3 feet of clay with a hydraulic conductivity of 10^{-7} or less, with a leachate collection system. In order to implement alternative C, the requirements for landfills 35 IAC 724 Subpart N must be met.

14. Page 2-7. Section 2.3.3.2. Pump and treat systems are usually considered as long-term remedial actions, not removal actions.

15. Page 4-2. As contained in the NCP please replace "Interagency Acceptance" with "State Acceptance."

16. Page 4-9, 4-13, 4-17, and 4-20. Refer to comments 2, 3, and 4, above pertaining to the technical impractibility waiver.

ILLINOIS DEPARTMENT OF
PUBLIC HEALTH
A Healthier Today For A Better Tomorrow

John R. Lumpkin, M.D., Director

February 23, 1994

Environmental Toxicology Case # 411038801H

Mr. Brad Bradley, Remedial Project Manager
US Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Dear Brad:

I reviewed the Draft Addendum to the Feasibility Study for the NL Industries/Taracorp Site in Granite City, Illinois. My comments are included in the table below.

Comments for Draft Addendum to the Feasibility Study		
Page Number	Paragraph	Comments
ES-1 1-3	4 & 6 1	Is any portion of Venice (where the soil lead levels are greater than 500 ppm and are not part of the Remote Fill Areas) included in the Residential Areas?
ES-2	3	Would the conclusions of the newest risk assessing methods result in the same conclusions as the old risk assessing methods.
ES-2	6	What is the 500 ppm action level based on?
ES-3	2	The NAAQS level of 1.5 $\mu g/m^3$ lead in the ambient air has not been exceeded in the Granite City area since the first quarter of 1984.
1-15	1	I did not have appendix A in my copy. Would the same action levels as were used in the ROD be the same as those calculated using the most current risk assessment guidelines, if not what would the difference be? Do the most current risk assessment levels use the most recent data regarding soil lead's actual contribution to total lead exposure.

If you have any questions regarding these comments, please feel free to contact me at the Edwardsville Regional Office, #22 Kettle River Drive, Edwardsville, IL 62025, telephone (618) 656-6680.

Sincerely,

David R. Webb
Environmental Toxicologist

cc: Division of Environmental Health
Edwardsville Regional Office